CANCapture Users Manual

Version 1.2

Table of Contents

Introduction 5
Graphical Workspace and Data Flowchart 6
- **Adding Functional Blocks** 8
  - **Source Device Function Blocks** 8
  - **Passive Interface Function Blocks** 9
  - **Active Interface Function Blocks** 12
- **Configuring Functional Blocks** 14
- **Connecting the Functional Blocks** 16
- **Renaming Functional Blocks** 18
- **Enabling / Disabling Functional Blocks** 19
- **Saving your Workspace Chart** 20
- **Retrieving a saved Workspace** 21
- **Exporting a Functional Block to a File** 22
- **Importing a saved Functional Block** 23
- **Starting and Stopping CANCapture** 24

Raw Capture Functional Block 26
- **Displaying the Raw Capture Window** 26

CAN Database 29
- **Modifying Packet Properties** 30
- **Adding a new Packet to the Database** 32

Graph Function Block 35
- **Adding or removing a series to your graph** 36
- **Selecting Variable(s) to Graph** 37
- **Editing a Series for Graphing** 38
- **Setting the Data Series Display Color** 39
- **Selecting Line Style for the Graph** 40
- **Selecting a Point Style Graph** 41
- **Selecting the Line Width for a series displayed as a Line Graph** 42
- **Selecting the Range Setting for the Data Series** 43
- **Setting the Minimum and Maximum Range Values for a Data Series** 44
- **Selecting the Default SPN Range Value** 45
- **Using the Panning Tool on the Graph Window** 46
- **Zooming in on a specific area of the graph** 47
- **Zooming Out** 47
- **Resetting All Graph Ranges to Default Values** 48
- **Enabling and Locating Display Cursors** 49

Bus Statistics Function Block 50

Variable Watch Function Block 51
- **The Variable Watch Display Column Options** 52
- **Selecting the Arrangement the Variable Watch Columns** 53
- **Selecting the variable you wish to display on Variable Watch** 53
- **Deleting Selected Items from the Variable Watch Window** 54

Enabling Data Logging from the Variable Watch Window 55
Selecting the Destination File for Data Logging 55
Variable Watch Data Logging Options 56
Packet Watch Function Block 57
Adding New Packets to the Packet Watch Window 58
Deleting Packets from the Packet Watch Window 59
Resetting Packets 60
Resetting Selected 60
Resetting All 60
Packet Filter Function Block 61
Adding a New Packet Filter 62
For a Raw Protocol Message enter the RAW Identifier (11-bit or 29-bit) 63
For a J1939 Protocol Message enter the PGN identifier 64
Entering a Message Description 64
Enabling / Disabling a Packet Filter 65
Forwarding Error Messages 65
Selecting the Packet Filter Message Columns to be Displayed 66
Selecting how the Packet Filter Display is Arranged 67
Completing the Packet Filter Configuration 68
J1939 Diagnostics Function Block 69
Selecting the Display Columns for the J1939 Diagnostic Window 70
Changing the Arrangement the Display on the J1939 Diagnostic Window 71
Clearing the J1939 Diagnostic Indicators 72
J1939 Diagnostic Display Tabs 72
Selecting Columns to Display on the J1939 Diagnostic Window 73
Selecting the Column Arrangement on the J1939 Diagnostic Window 74
Options on the J1939 Diagnostic Window 74
DTC Options 75
Selecting Goto Definition on the DTC Options Menu 76
Adding a New Variable Watch Window for the DTC 77
Adding a DTC to a Variable Watch Window 78
Adding the DTC(s) to a Graph Window 79
Adding a DTC(s) to an existing Graph Window 80
Requesting Active DTCs 81
Requesting an Active DTC Reset (DM11) 82
Clearing the Active DTC List 83
Replay Recorder Function Block 84
Saving Can Message Data 85
Selecting the file Overwrite option 85
Setting the Level of Compression of the Data File 86
Live Replay Function Block 87
Enabling / Disabling the Live Replay Function Block 88
Modifying the Replay Block Caption 88
Selecting if the Caption is Visible 89
Selecting the Data File to Playback 89
Setting the Playback Speed 90

Miscellaneous Settings for the Playback Block 91
11-bit and 29-bit Message Transmitter Function Blocks 92
Selecting the CAN Data Column Display Format (29-bit Only) 93
Adding a New Transmit Message 93
Displaying the Data in Hexadecimal 94
Setting the Trigger Type 94
Selecting the Hot Key for Triggering the Message Transmitter 95
Selecting a Single Shot Trigger 95
Selecting a Recurring Trigger 96
Setting the Time Interval for a Recurring Message 96
Setting the Time Delay for a Single Shot Trigger 97
Entering the Message Description 97
Entering the Message Data 98
CCP Tester Function Block (Advanced Users) 99
Custom Script Function Block (Advanced Users) 100
Displaying the Custom Script Output Window 102
Displaying Custom Script Functional Block Help 103
User Panel Function Block 104
Invoking the Designer Mode 105
Adding a New Custom Gauge 106
Adding an Edit Box or Label Control 106
Adding a Circular Gauge, Numeric Indicator, or Linear Gauge 107
Overview of the Gauge Container 108
Edit Properties of a Gauge Element 109
Add Gauge Element to Existing Gauge Container 111
Delete Gauge Element from a Gauge Container 112
Apply Gauge Appearance Theme 113
Repositioning the Custom Gauge Container 114
Linking a CAN Variable to a Gauge Element 115
Linking and Setting the Source Variable 116
Saving a Custom Gauge Design 117
Importing Saved Gauges 119

Introduction

Thank you for purchasing CANCapture from the Professional Products Group of EControls, Inc. the complete controller area network (CAN) solution, offering every feature one would expect from a CAN diagnostic and analysis tool and more.

To start using CANCapture you will first need to install the software. Please refer to the software installation guide provided.

CANCapture is supplied with a custom ECOM cable that is enabled to run you new CANCapture software. The ECOM cable is a USB2.0 High-Speed device that allows Controller Area Network (CAN) traffic to be transmitted and received using a computer or laptop. You may distribute the software to as many target machines that you like; however, the software will only operate with the CANCapture enabled ECOM device.

EControls ECOM USB CAN Interface

Graphical Workspace and Data Flowchart

CANCapture uses a graphical data work space flow chart as its centralized location for managing and controlling the program's behavior. The flow chart is used to visually control the flow of CAN traffic in and out of various Functional Blocks which can each handle, interpret, and react to data in unique ways. The flow chart is highly flexible, allowing one to freely manipulate blocks and draw interconnects at any time (before or during a "live" capture) and in any way.

- Completely flexible - add unlimited function blocks anywhere on the grid and join them with interconnect lines that can be branched and connected in any way. Interconnect lines turn green to easily identify when they are properly connected.
- The flow chart can be manipulated during a "live" capture and will immediately respond to changes. There's no need to stop a session just to change the data flow.
- Each block corresponds to its respective window (or panel), which can be renamed, disabled, focused, or removed all from the chart.
- Cut, copy, and paste support as well as an import and export feature for saving and sharing configurations with others; for example, you can easily export your list of transmit messages or a custom packet filter to share with a colleague.

The ECOM block is typically the source of all messages throughout the CANCapture flow chart. Using the flexible nature of CANCapture's flow chart, one can easily wire and route the messages received on the CAN bus in an unlimited number of ways. For example, the output port of one ECOM block can be routed to the input port of another to create a simple bridge between two CAN buses. Alternately, a packet filter or custom script can be placed between the two so that only specific messages will be forwarded - the possibilities are virtually endless.

Every message that is received by the ECOM block contains a hardware timestamp that is accurate within microseconds. The ECOM is capable of capturing CAN 2.0A (11-bit), CAN 2.0B (29-bit) messages, and all CAN error frames. All messages are fully supported throughout the CANCapture database and software.

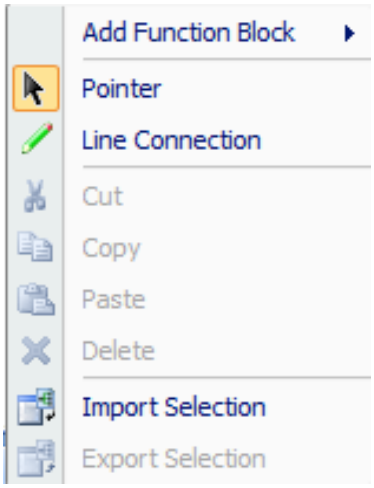
J1939 multi-packet and NMEA-2000 Fast Packet messages are seamlessly supported by the ECOM block. Immediately after the final packet of the J1939 connection management session is received, the reassembled multi-packet message will be injected into the stream (unless disabled in the ECOM block properties). All other blocks that receive this message will treat it like a normal packet. This means that a packet-watch can monitor the packet's statistics; additionally user panels, graphs, and variable-watches can all access each variable of the multi-packet message.

If more than one ECOM device needs to be used in a CANCapture flow chart, the properties of each block can be manually configured to assign a specific device serial

number to each. In addition specific CAN error frames and J1939 multi-packet support can be enabled or disabled in the properties.

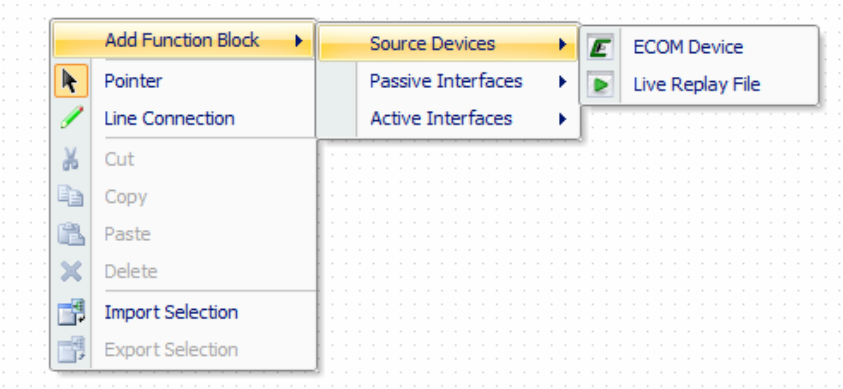
Adding Functional Blocks

To add a Functional Block to the **Graphical Data Flowchart** simply click the right-hand mouse button to display the valid choices.



Source Device Function Blocks

You may add a CAN message **Source Device** by selecting **[Add Functional Block ▶ Source Devices]**. The following will be displayed.



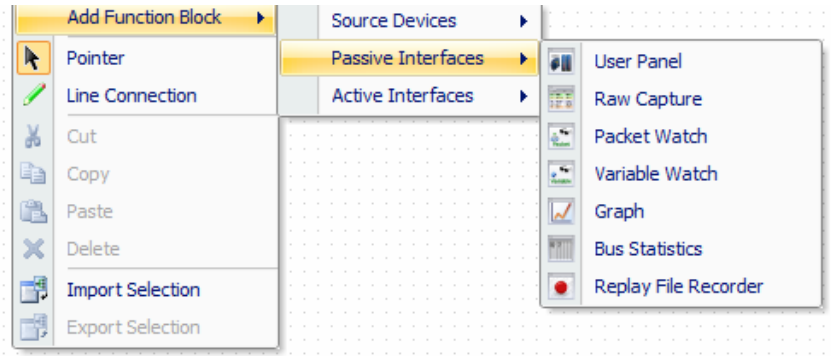
Source Device selections are:

ECOM Device - The ECOM function block is used to represent an ECOM device physically connected to the local computer. As each message (or error frame) is received from the CAN bus, it is sent to the output port of the block. If a trace is connected to the input port of the ECOM block, then each incoming message that is received will be transmitted on the respective CAN bus.

Live Replay File - The Live Replay Block is used to playback CAN sessions that were previously captured and saved using a Recorder Block. The recorder simply saves every received CAN message to a user specified file so that it can be replayed at a later time. The live replay allows real-time playback, preserving all original timestamps in the process. An entire saved session can be perfectly replayed for repeated analysis; furthermore, the rate of playback can be changed anywhere from 1/10th to 100x the original speed.

Passive Interface Function Blocks

You may add a **Passive Functional Block** by left clicking the mouse on the specific selection in the drop down menu as illustrated below.



The selections are:

User Panel - The user panel block is designed specifically to display and monitor real-time data using a variety of fully customizable gauges, thermostats, number sliders, and text labels. The panel consists of a simple form editor that allows gauge items to be added and linked to any variable in the CAN database. Every aspect of the items can be configured to create a unique appearance; custom and pre-designed themes are also available.

Raw Capture - displays a real-time list of every CAN message (or error message) that is received by its input port. Aside from showing all the relevant information, if an

incoming packet is defined in the current CAN database, the packet will be highlighted using the assigned color-code. The block also provides "live" text filtering based on all displayed columns, advanced hierarchical column sorting, locked/unlocked automatic scrolling, exporting to excel for post-analysis, full integration with the active CAN database, an advanced details view for each packet, and the ability to display all relevant fields in either decimal or hexadecimal.

Packet Watch - The Packet Watch Block is used to monitor the statistics of individual packets received on the CAN network. It can be used to measure the average period, total message count, message rate, maximum period, minimum period, and last time received for any message type. All measurements are high-precision due to the utilization of hardware timestamps from the ECOM device are used.

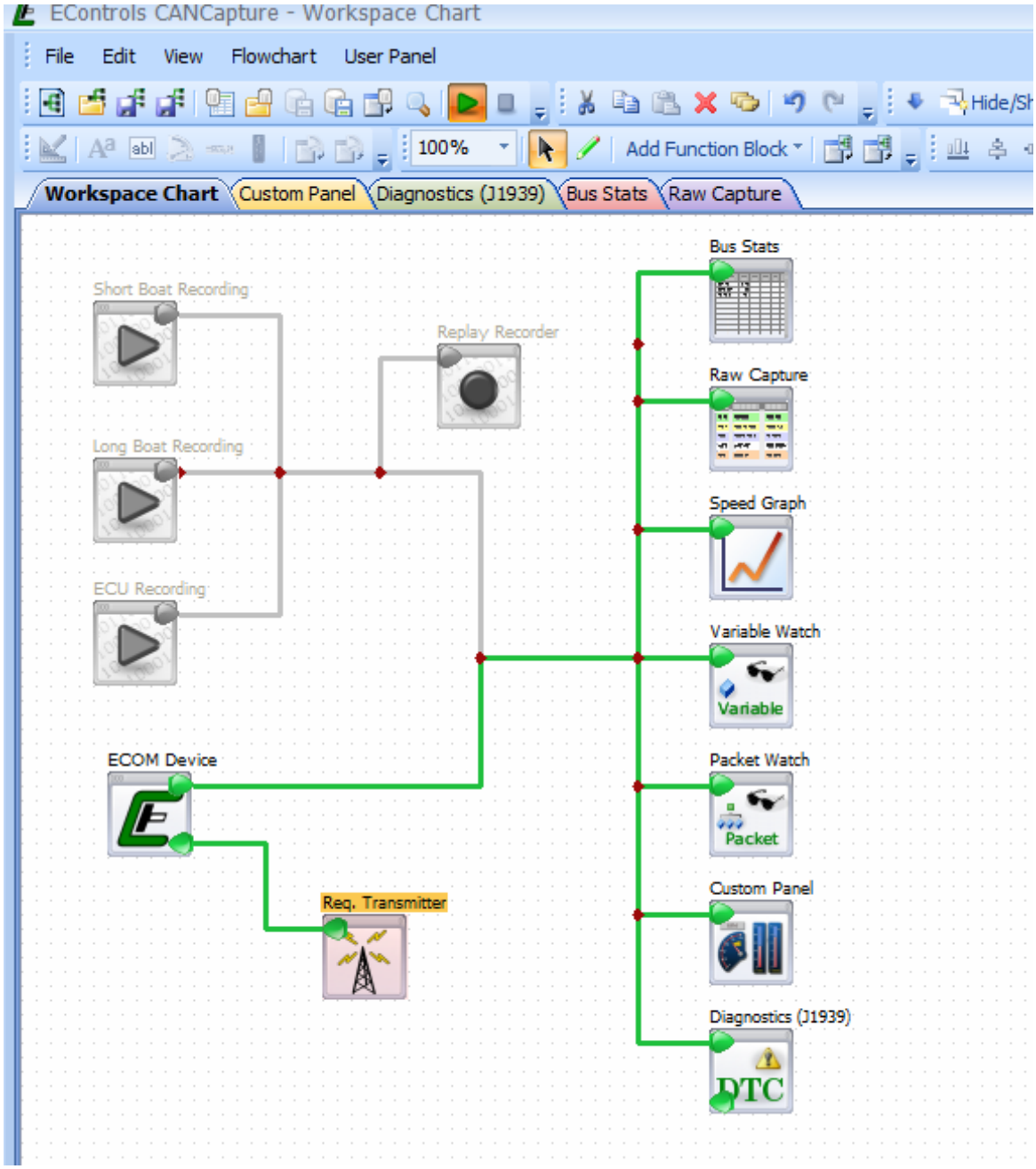
Variable Watch - The Variable Watch Block is used to monitor the value and stats of individual CAN variables. The watch list reports the current value as well as the average received period, total count, and last received timestamp for each chosen variable. The block also supports exporting all variables to a Microsoft Excel CSV file for easy post-analysis.

Graph - The graph block is used to plot any variable in the CAN database; as each variable is received, it is plotted in real-time in the graph window. The graph was developed completely from scratch with the sole purpose of being able to handle streaming data with a moving time axis. Due to its tuned development efforts and focus on performance, there is not a graphing tool available that is smoother or better suited for real-time streaming data; response and display time is instantaneous.

Bus Statistics - The Bus Statistics Block is used to report statistics for all CAN messages that are received. It displays information about the total packet counts, error counts, multi-packet counts, data transmission rates, bus loading, capture time, and the capture state.

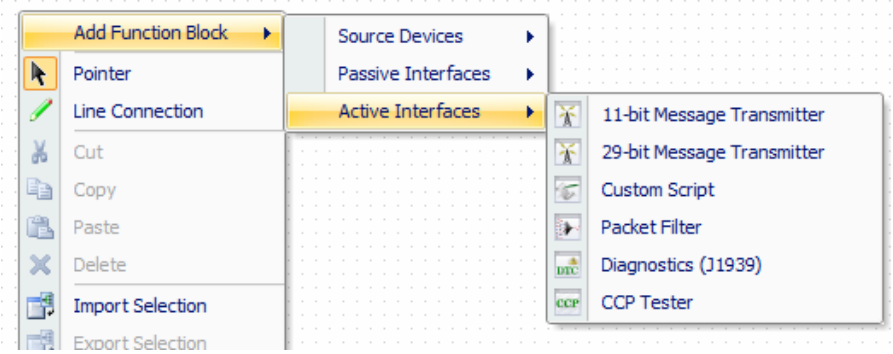
Replay File Recorder - The recorder saves every received CAN message to a user specified file so that it can be replayed at a later time. The live replay allows real-time playback, preserving all original timestamps in the process. An entire saved session can be perfectly replayed for repeated analysis; furthermore, the rate of playback can be changed anywhere from 1/10th to 100x the original speed.

The Graphical Workspace Flowchart



Active Interface Function Blocks

To add **Active Functional Blocks** select **Active Interfaces** as illustrated below.



The selections are:

11-bit Message Transmitter - The 11-bit and 29-bit Transmitter Blocks are used to generate messages on the CAN network. Each transmitter can be configured to send pre-defined messages after a certain time offset, at a recurring interval, or after a hot-key is pressed by the user. Standard CAN and J1939 packets are both supported along with all relevant fields.

29-bit Message Transmitter - The 11-bit and 29-bit Transmitter Blocks are used to generate messages on the CAN network. Each transmitter can be configured to send pre-defined messages after a certain time offset, at a recurring interval, or after a hot-key is pressed by the user. Standard CAN and J1939 packets are both supported along with all relevant fields.

Custom Script - The Script Block is used to write customized code that can interact with incoming and outgoing packets. The C/C++ like syntax can be easily learned, even by non-programmers, based on the many examples and documentation that is available. If a special function is needed and none of the other blocks can do it, the scripting will be able to fill the gap. Easily implement advanced filters, triggered responses, data encryption/decryption, end-of-line testing procedures, node emulators, etc.

Packet Filter - The Packet Filter Block is used to selectively forward incoming CAN packets to the blocks output port. Each filter can be configured as either a "Pass Filter," where only matching packets get forwarded, or as a "Reject Filter," where all messages are forwarded except those that match. Packets can be added, removed, enabled, or disabled, all while the capture is still "live".

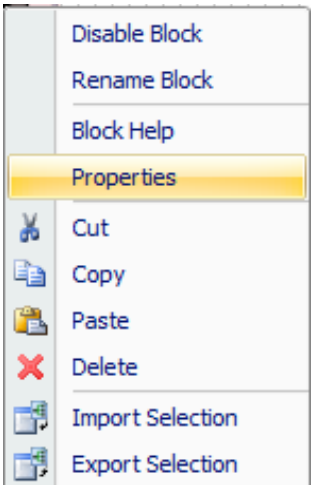
Diagnostics (J1939) - The J1939 Diagnostic Block is used to display diagnostic trouble codes (DTCs) and other fault-code information for J1939 based systems. The diagnostic window displays the Malfunction Indicator Lamp (MIL), Red Stop Lamp, Amber Warning Lamp, and Protect Lamp states for all systems on the CAN network. It also has

the ability to display an interactive list of all active, pending, and historic DTCs as well as freeze frame data and information.

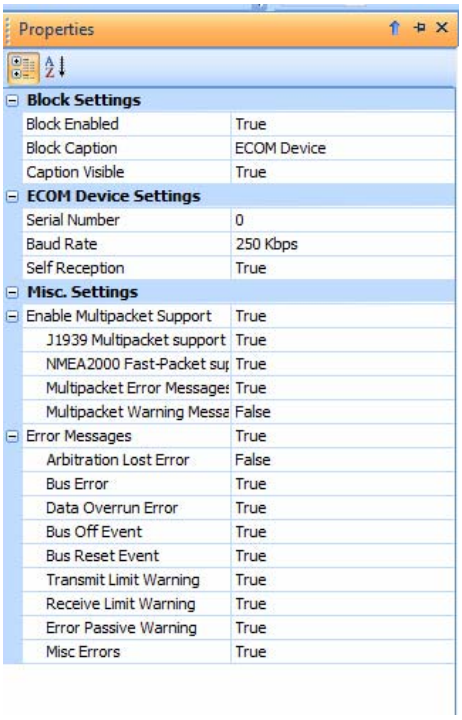
CCP Tester - The CCP block is used to test and diagnose a CAN Calibration Protocol (CCP) implementation. The block supports all the fundamental CCP commands: CONNECT, GET_CCP_VERSION, EXCHANGE_ID, GET_SEED, UNLOCK (CAL resource), SET_MTA, DOWNLOAD, UPLOAD, and DISCONNECT. It allows the user to enter a simple script to perform the custom GET_SEED/UNLOCK sequence and provides support for reading and writing arbitrary memory addresses in an ECU.

Configuring Functional Blocks

Each **Functional Block** may be configured by selecting desired functional block and right clicking the mouse button then selecting **[Properties]** from the drop down menu and left clicking the mouse on the selection as illustrated below.



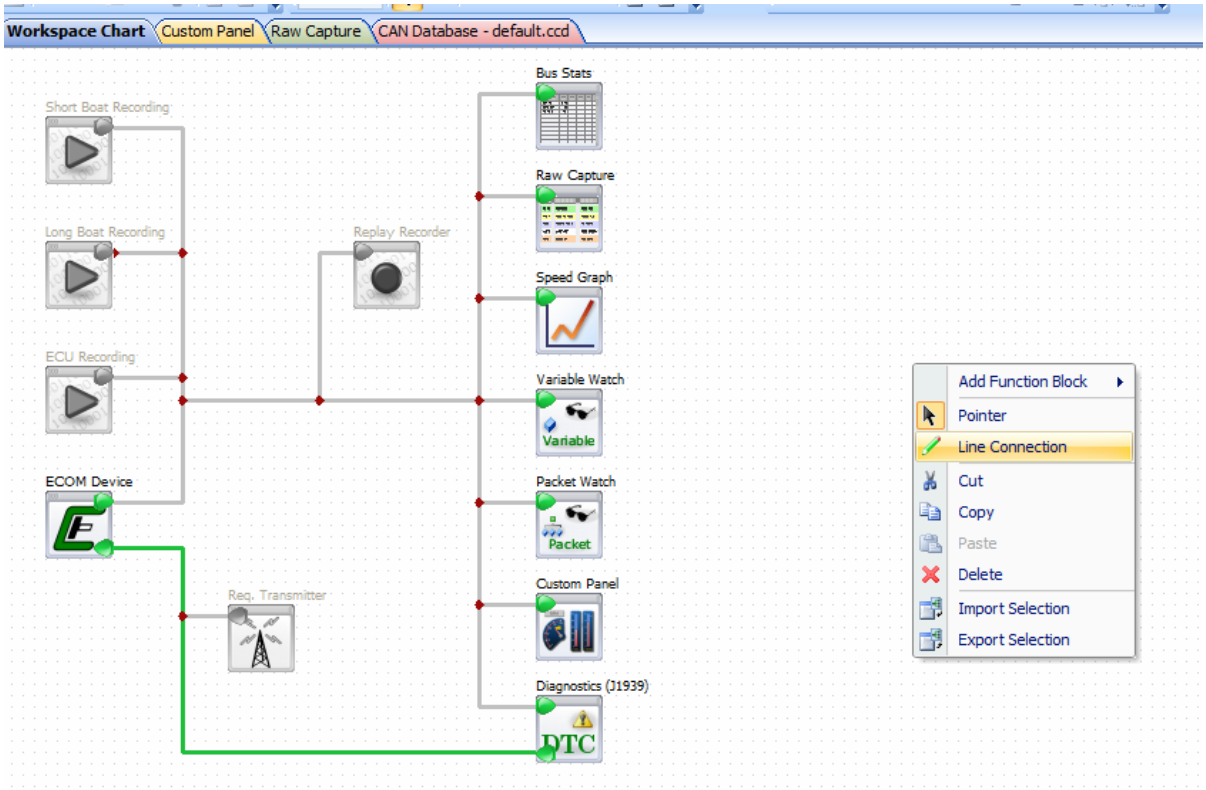
The properties window will indicate the parameters of the selected functional block.

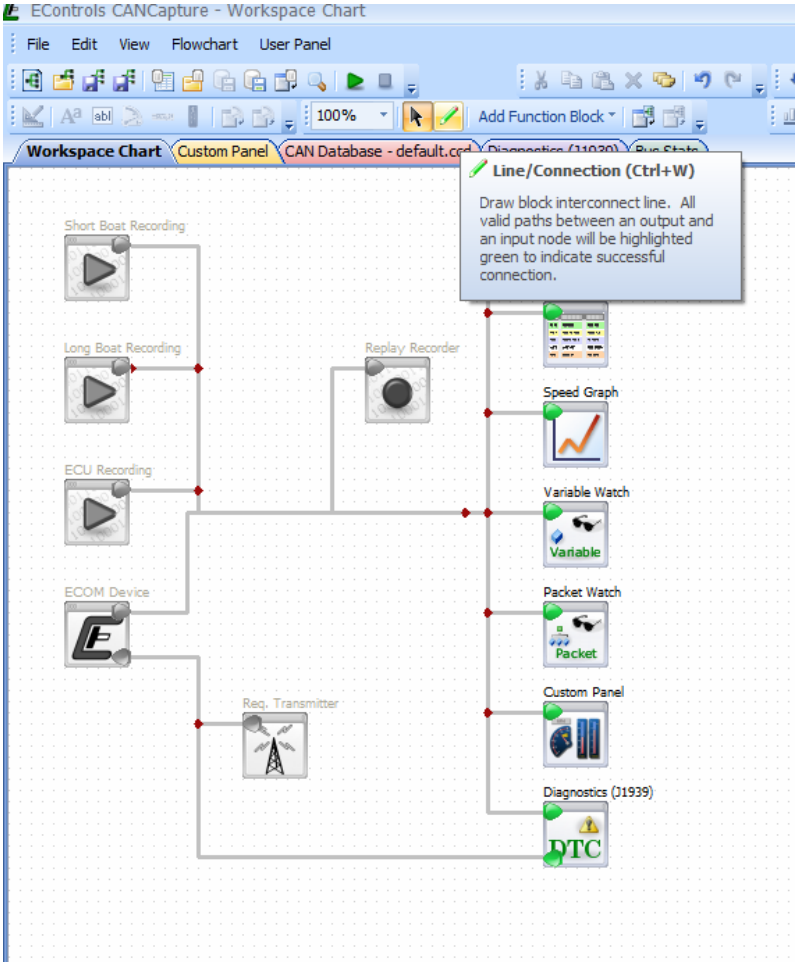


Any of the parameters may be modified by simply left clicking on the parameter you wish you modify. Parameters that have boundaries on their values have a drop down menu for the selection of the valid choices for that particular parameter.

Connecting the Functional Blocks

To connect the respective **Function Blocks** to the output of an the **ECOM** or **Replay Recorder or any other block** , you simply right click on the workspace and select **[Line Connector]** or select the **Line Connector (Crtl+W)** icon on the **Graphical Workspace Toolbar Menu** and connect to the input of the Functional Block you wish to receive the CAN messages as illustrated below.

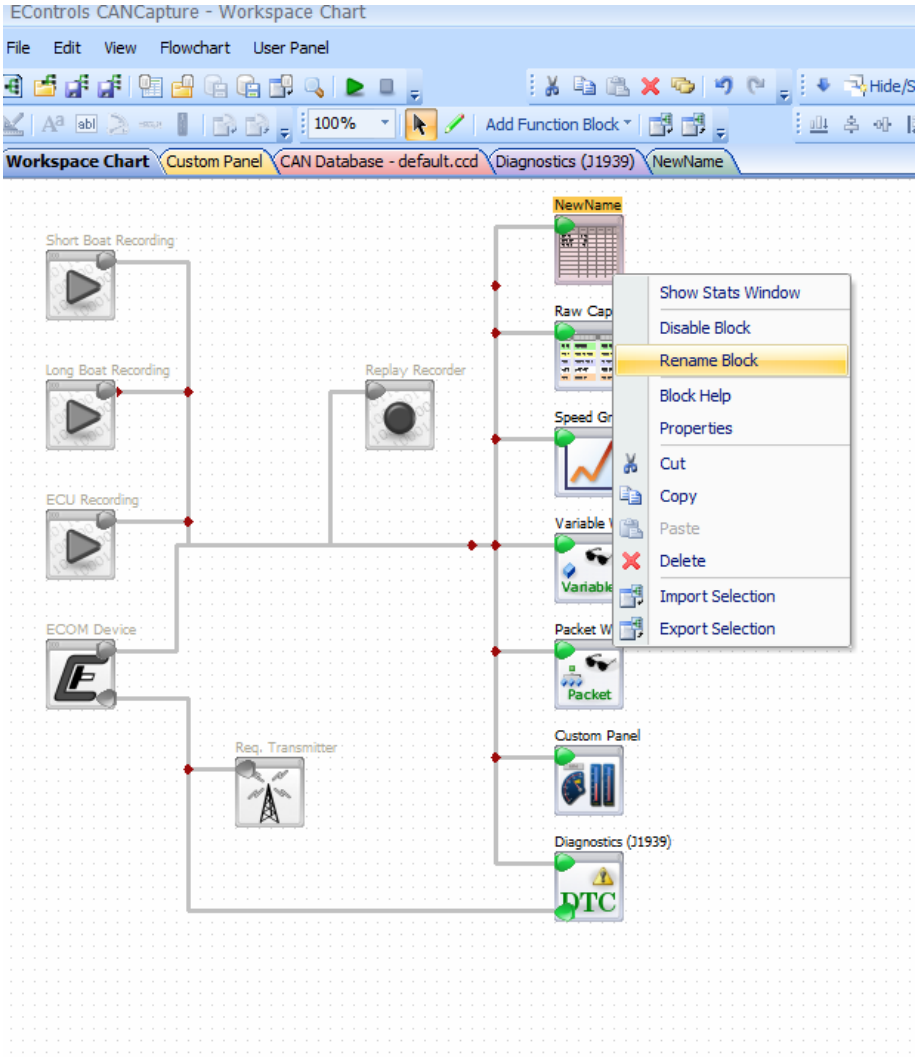




The **Drawing Pen** will now appear. You may now connect the **Functional Blocks** as you please. When you have completed the connection of the **Functional Blocks** you may exit the **Line Connection** function by depressing the **[ESC]** key on the keyboard or select the **[Pointer]** option from the drop down menu.

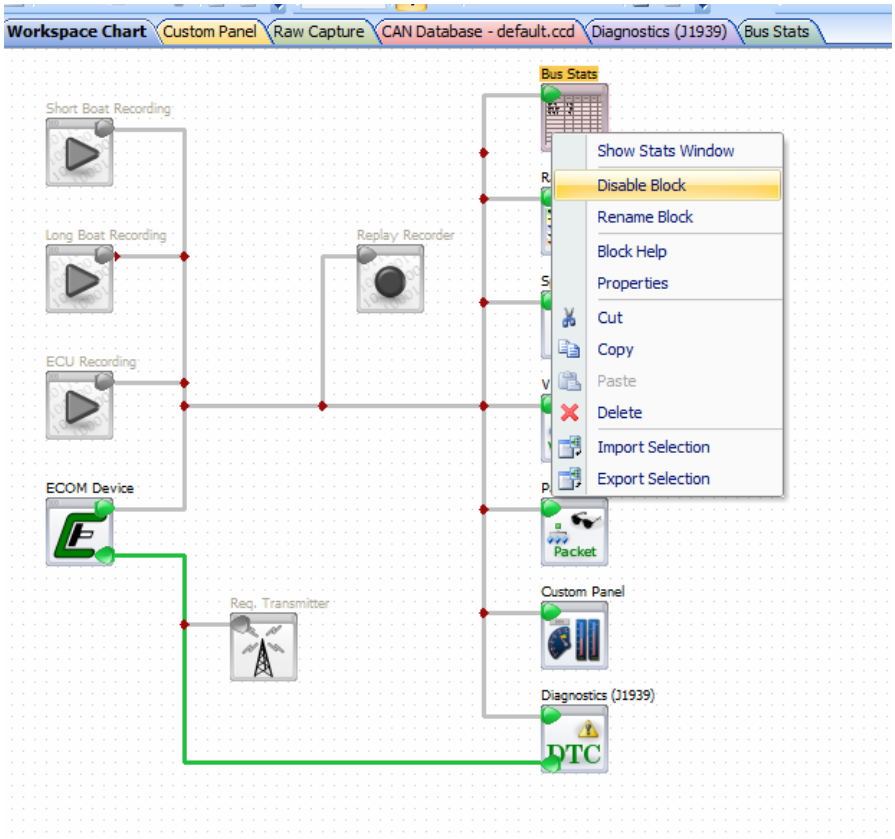
Renaming Functional Blocks

You may rename the **Functional Blocks** by right clicking on the **Functional Block** that you want to rename and selecting **[Rename Block]** by left clicking on the selection and typing in a unique name of your choice as illustrated below. Alternatively, you may depress the F2 Key on the keyboard with the Function Block selected.



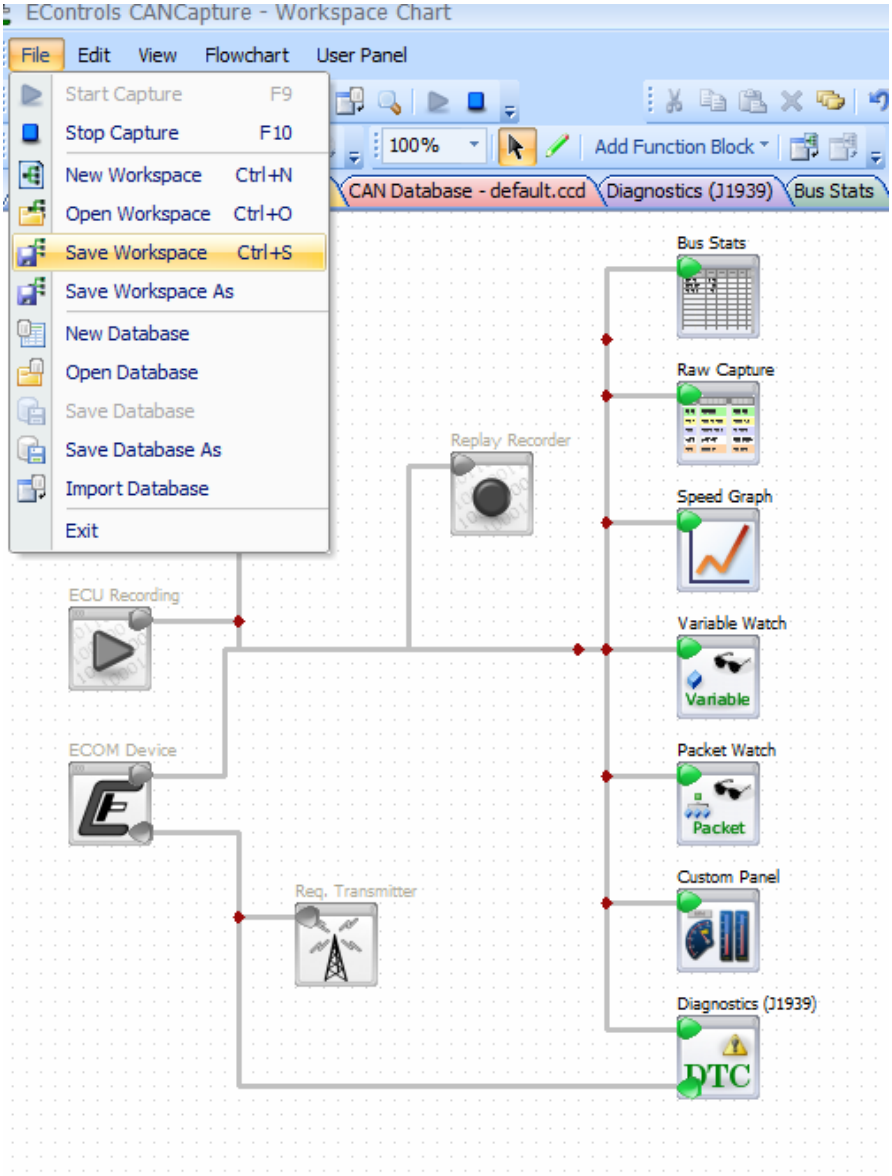
Enabling / Disabling Functional Blocks

You may **Enable** or **Disable** a functional block, either active or passive, by left clicking on the **Functional Block** you wish to effect and select either **[Disable Block]** or **[Enable Block]** from the drop down menu by left clicking the mouse on the selection as illustrated below.



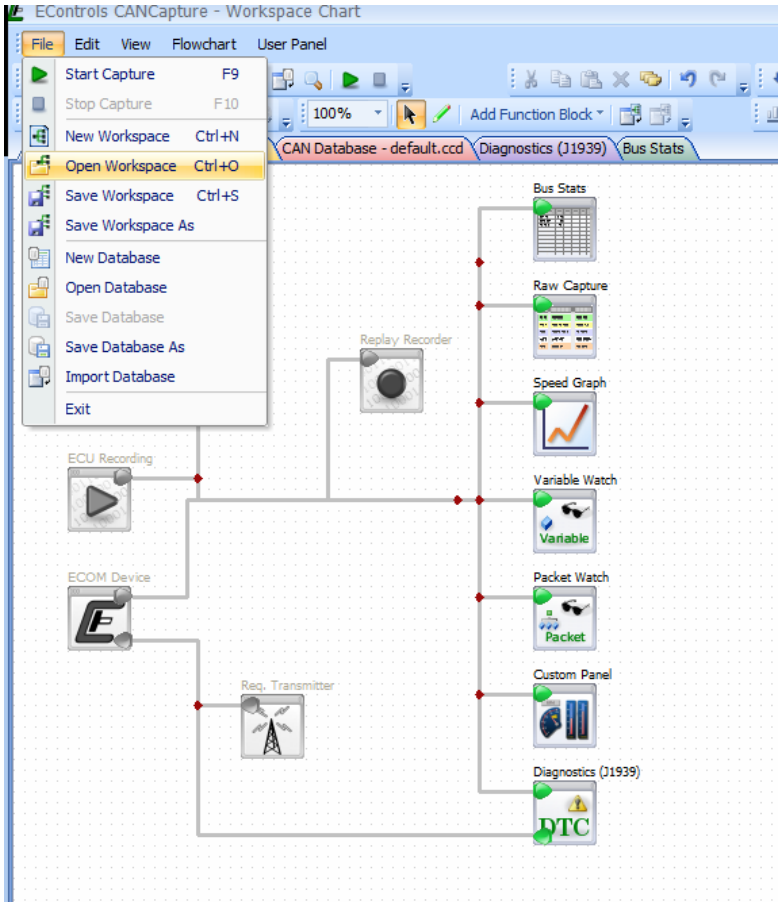
Saving your Workspace Chart

You may save your **Workspace Chart** to a location of your choice by selecting **[File]** on the upper tool bar menu and then **[Save Workspace]** or **[Save Workspace As Ctrl+S]** from the drop down menu by left clicking the mouse on the selection. Select the location where you want to save the **Workplace Chart** and double click on the **[Save]** button as illustrated below.



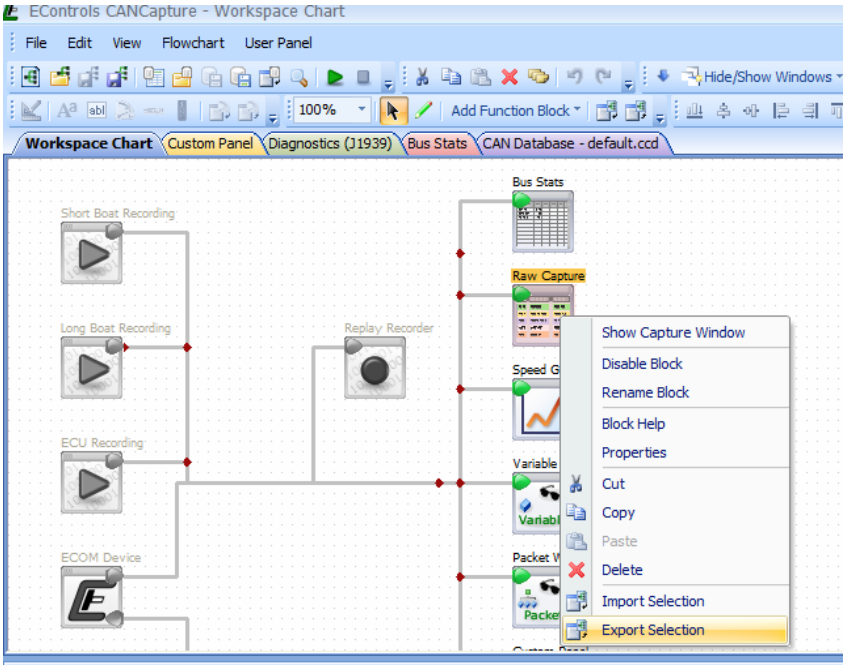
Retrieving a saved Workspace

You may **Retrieve** a saved **Workspace Chart** by selecting **[File]** on the **Tool Bar Menu** and then selecting **[Open Workspace Ctrl+O]**. When the window opens, select the location of the saved **Workspace Chart** that you want to retrieve and select it by double clicking with the left-hand mouse button as illustrated below.



Exporting a Functional Block to a File

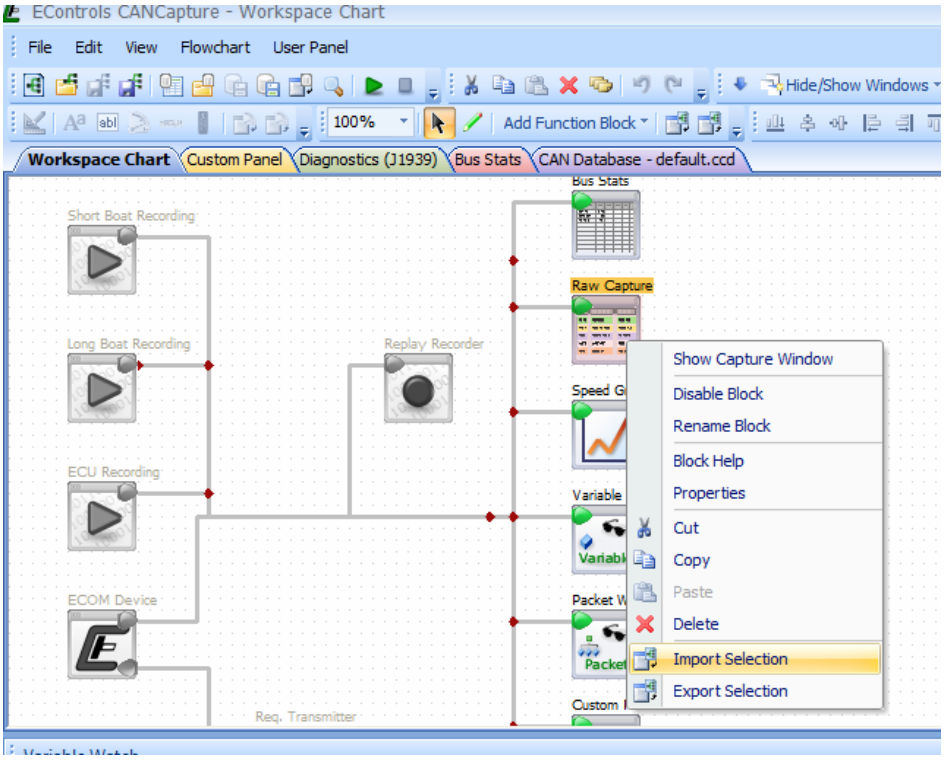
You may save a **Functional Block** with all the settings you have selected to a file of your choice. To save the **Functional Block** right click the mouse on the **Functional Block** and select **[Export Selection]** by left clicking on the selection as illustrated below.



You may now select the location on you computer where you wish to save the **Functional Block** for importing at a later time. You may give the file a name of your choice and select **[Save].**

Importing a saved Functional Block

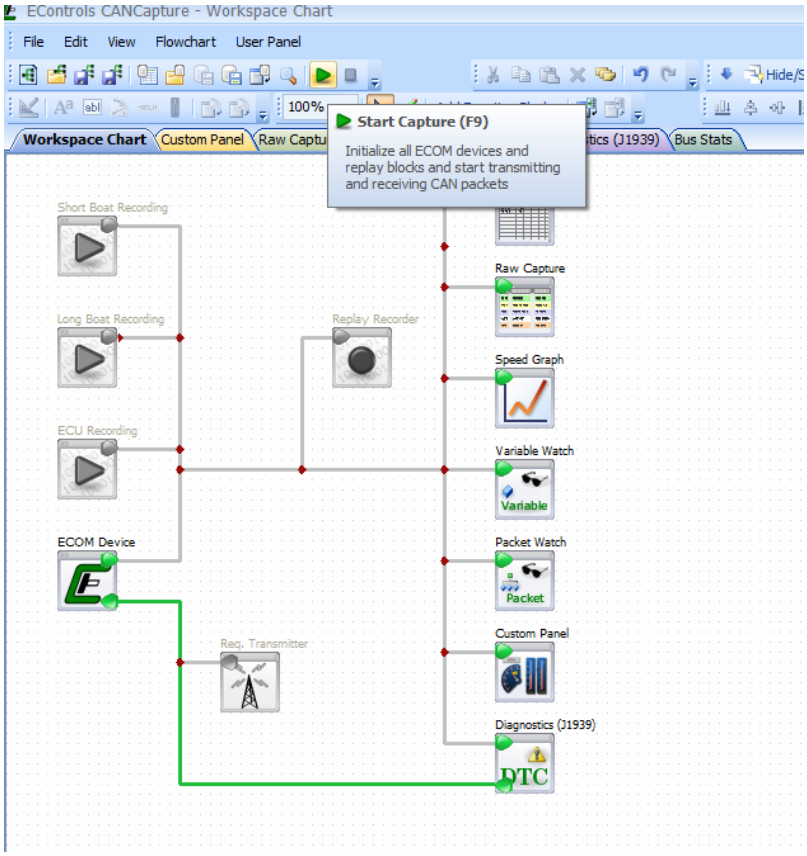
You may **Import** a saved **Functional Block** to your **Workspace Flowchart** by right clicking on a **the Workspace** and selecting **[Import Selection]** from the drop down menu by left clicking the mouse on the selection as illustrated below.



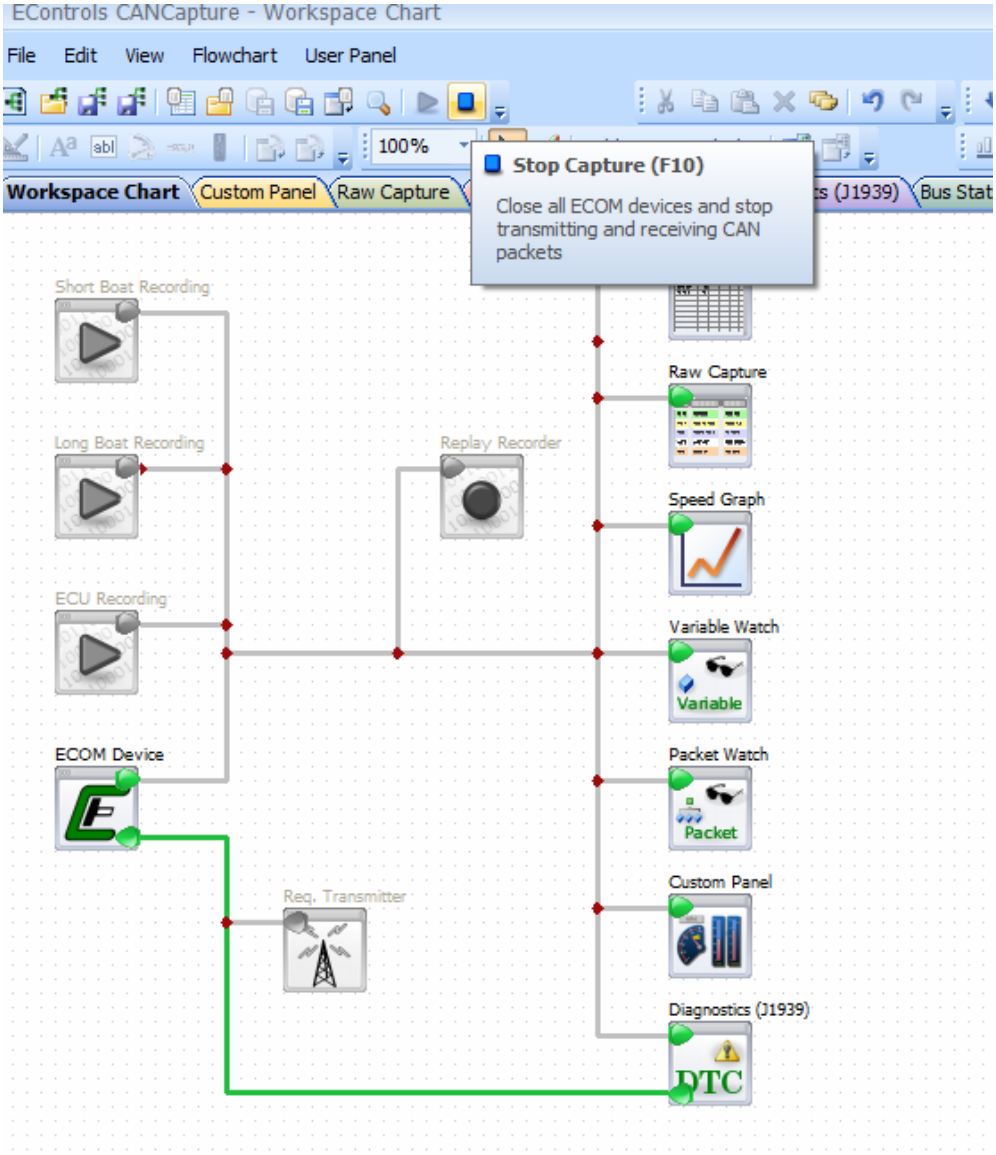
You may now navigate to the file name that you exported the **Functional Block** properties to and select **[Open]**.

Starting and Stopping CANCapture

To initialize **CANCapture** select the green arrow [▶] in the toolbar or depress **F9** on the keyboard as illustrated below. This will enable all **ECOM** devices and **Replay Blocks** and begin transmitting and receiving CAN messages.



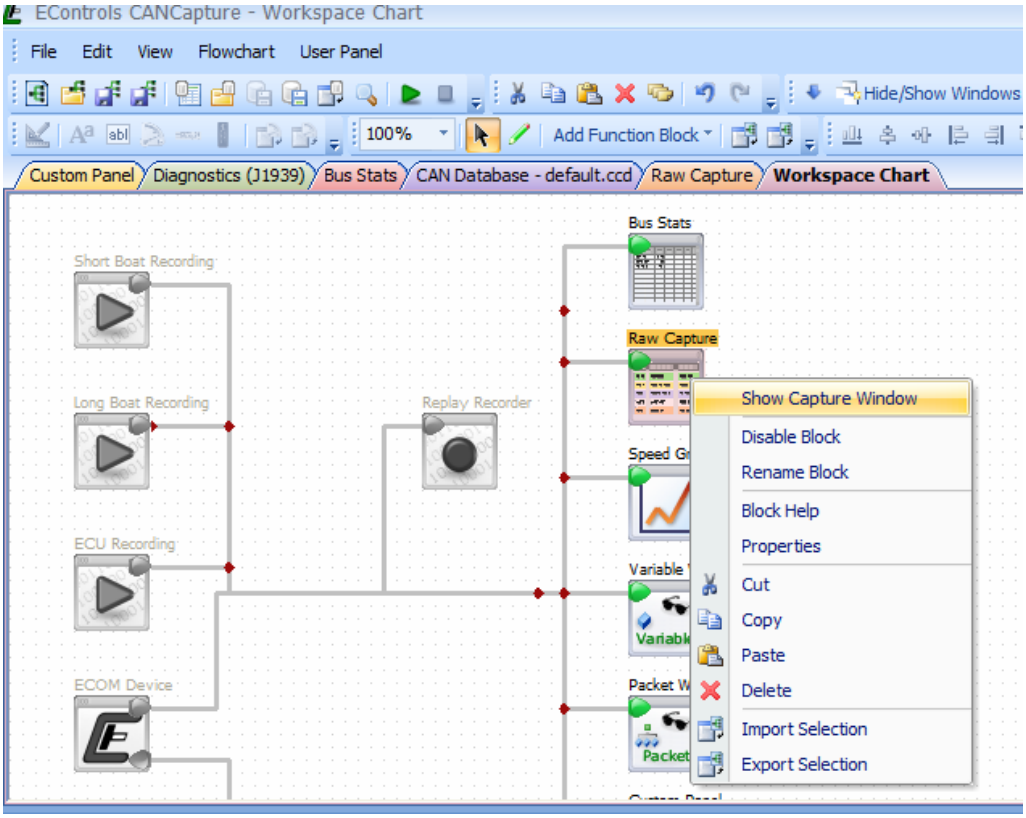
To **Stop** CANCapture select the blue square [■] to the right of the start icon by clicking the left hand mouse button on the **Stop Capture** icon or depress **F10** on the keyboard. This will disable all **ECOM** devices and **Replay Recorders** and stop transmitting and receiving CAN messages.



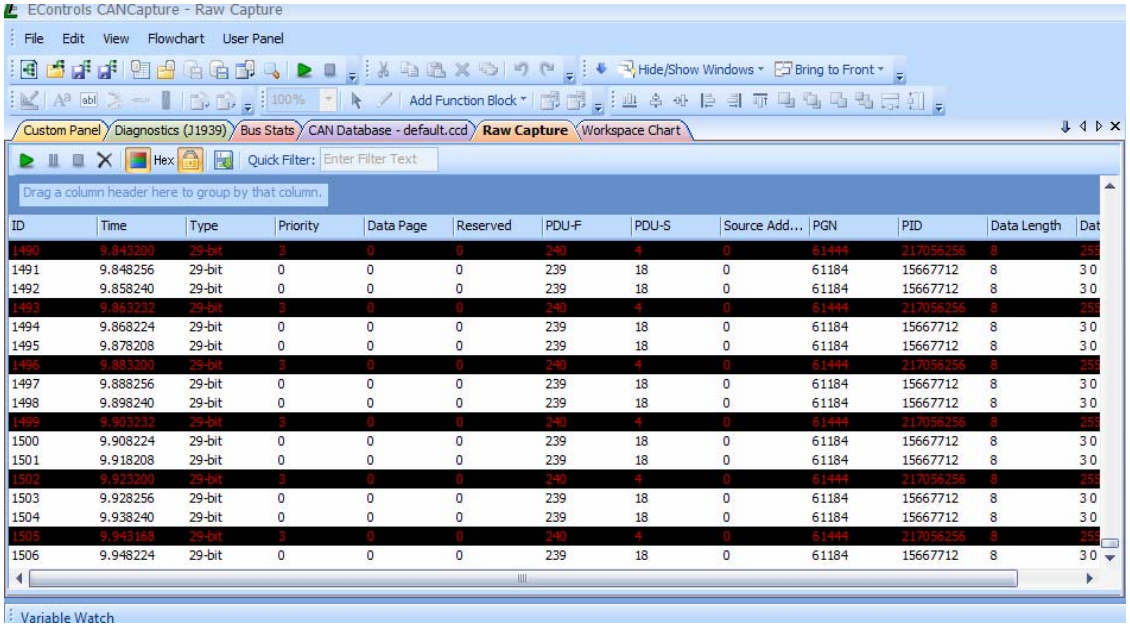
Raw Capture Functional Block

Displaying the Raw Capture Window

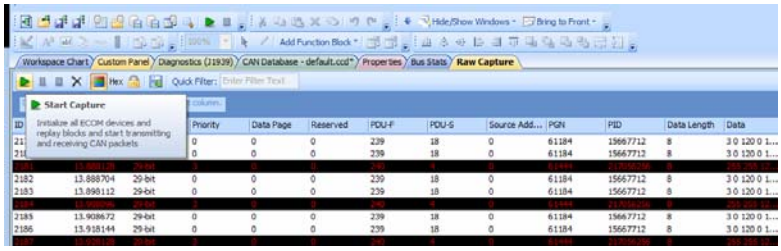
You may display a capture window by right clicking on the specific **Functional Block** you want to display and selecting **[Show Capture Window]** by left clicking the mouse on the selection as illustrated below**.**

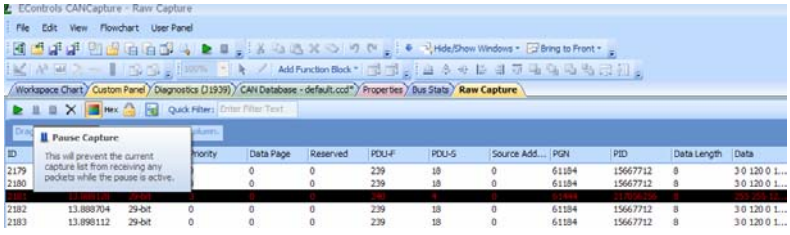


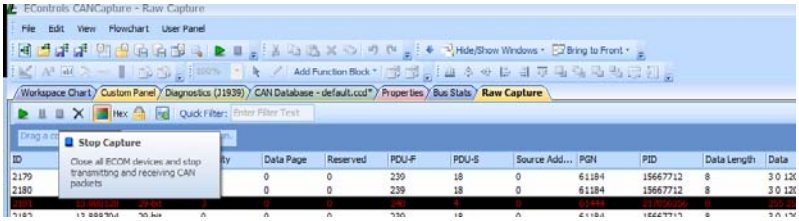
CANCapture will now display the data associated with the selected **Functional Block** on the display window. An example of a **Raw Capture** Window is illustrated below.



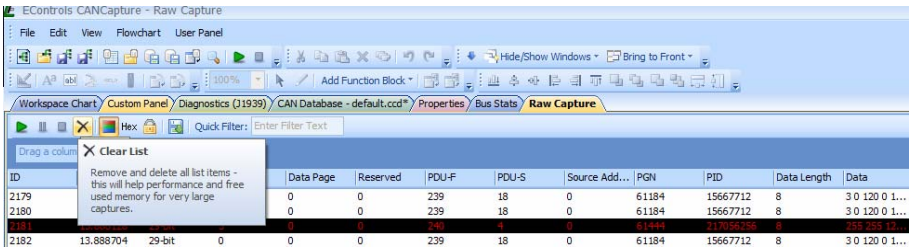
You may **Start**, **Pause**, or **Stop** the capture from the tool bar menu on the **RAW Capture** window.



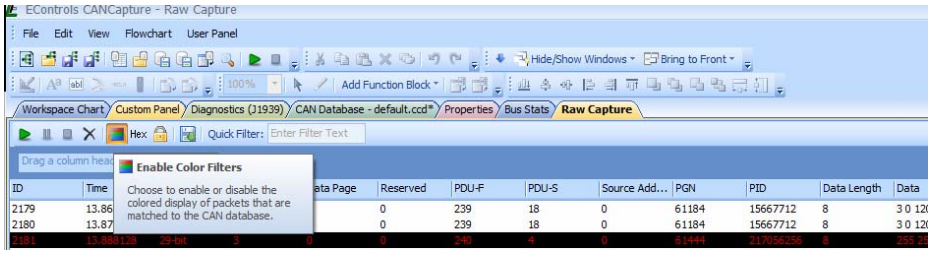




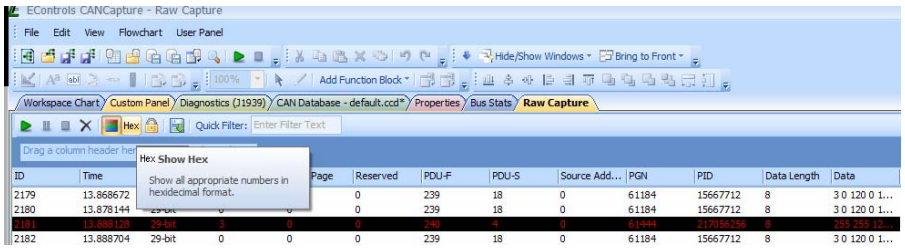
You may clear the **Raw Capture** list by selecting the **Clear List** Icon located on the **Raw Capture** tool bar.



You can enable or disable the **Color filter** by selecting the Enable **Color Filters** icon located on the **Raw Capture** tool bar menu.



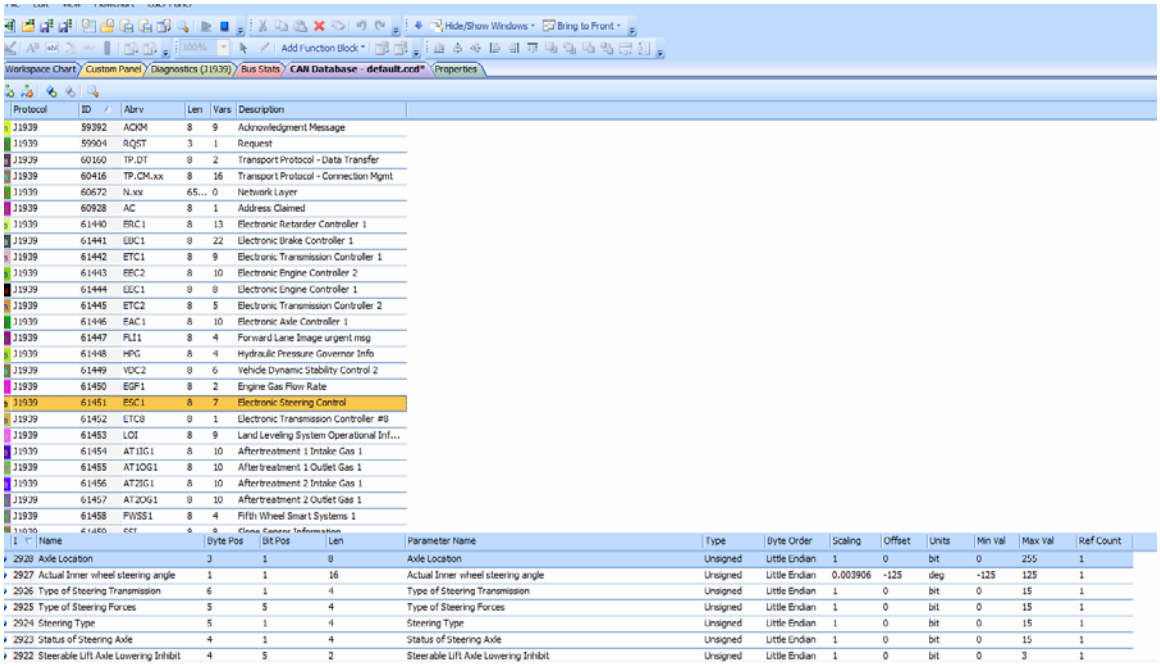
The display can be in either hexadecimal or decimal by selecting the **HEX** icon form the **Raw Capture** tool bar menu**.**



CAN Database

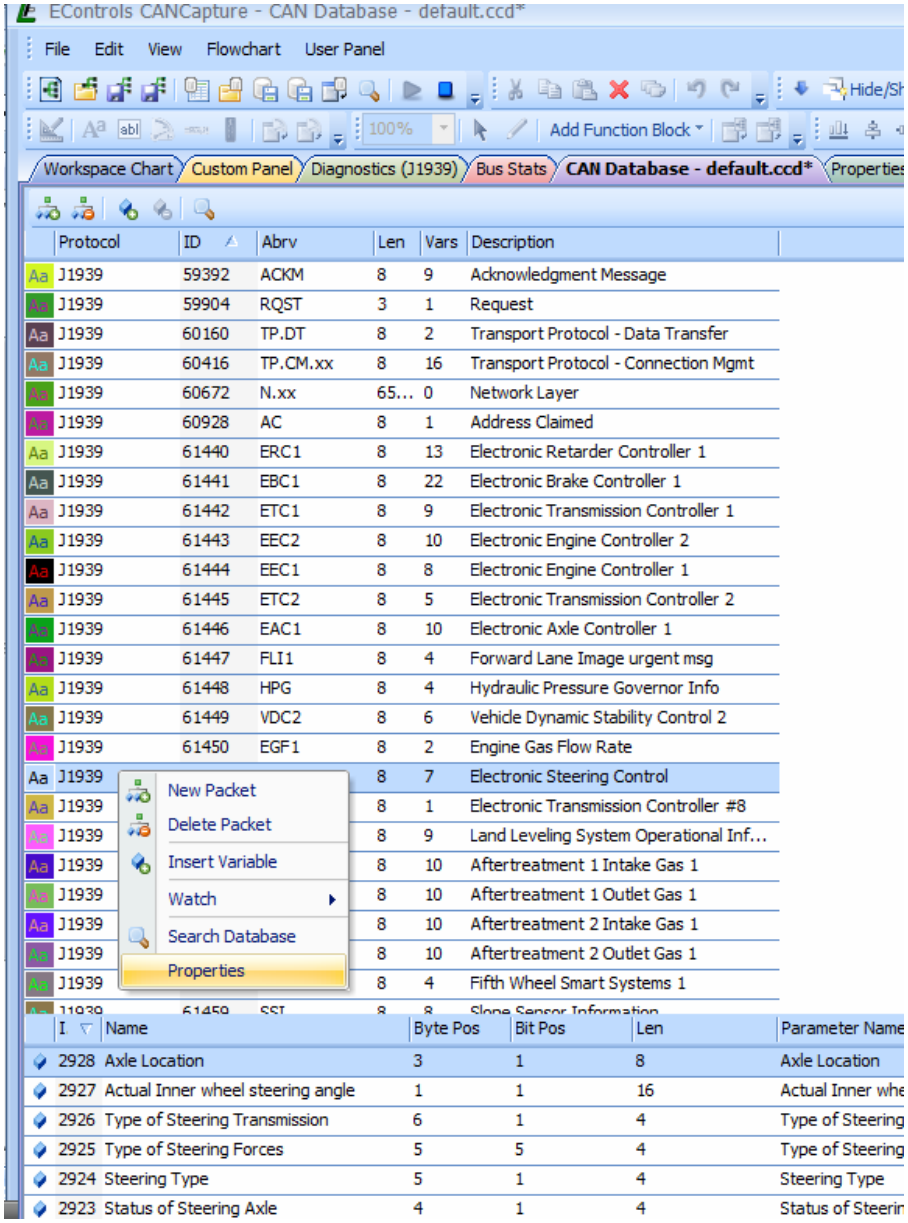
The CAN database is used to identify every packet that is received on the CAN network and passed within the graphical flow chart. Packets are broken into individual variables, and each variable can be assigned a unique conversion formula, operational range, unit, and name. The **CANCapture database** supports the standard features one would expect from a **CAN database**, along with many other features:

- The database is integrated into the application, so you can easily add new definitions, jump to existing, add new graphs or variable watches, and manage all variables from one convenient location.
- Support for all variations of CAN protocols - SAE J1939, CANbus, NMEA-2000, and other proprietary specifications. Includes full J1939 database and natively supports PGN and SPN identifiers.
- Supports importing of other existing .DBC databases.
- Assign color codes to each packet to help easily identify each message type in the "Raw Capture" list.
- Signed, unsigned, IEEE float, IEEE double, and ASCII variable types along with big or little (Motorola or Intel) byte ordering.
- Includes support for the NMEA-2000 Fast Packets and the J1939 transport protocol, including J1939 multi-packet messages, variable length ASCII SPNs, and diagnostic messages and diagnostic trouble codes
- Integrated "hot-filter" search functionality allows quick and easy access to all variables.

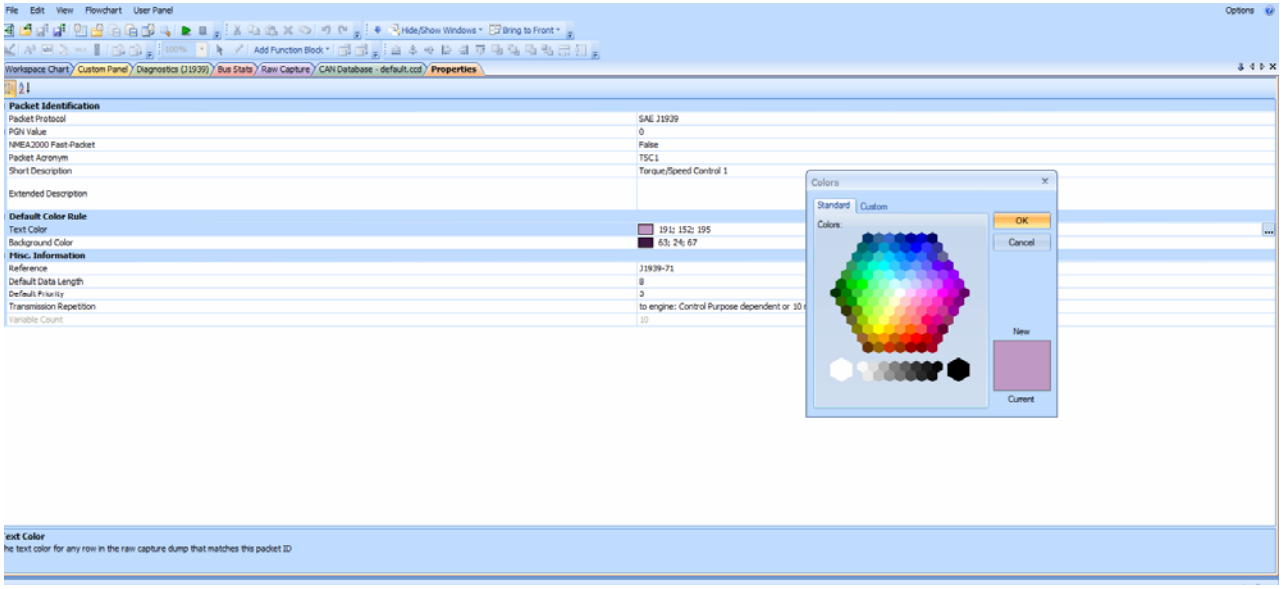

Workspace Chart
Custom Panel
Diagnostics (J1939)
Bus Stats
CAN Database - default.ccd*
Properties
Protocol ID Abrv Len Vars Description
J1939 59392 ACKM 8 9 Acknowledgment Message
J1939 59904 RQST 3 1 Request
J1939 60160 TP.DT 8 2 Transport Protocol - Data Transfer
J1939 60416 TP.CM.xx 8 16 Transport Protocol - Connection Mgmt
J1939 60672 N.xx 65... 0 Network Layer
J1939 60928 AC 8 1 Address Claimed
J1939 61440 ERC1 8 13 Electronic Retarder Controller 1
J1939 61441 EBC1 8 22 Electronic Brake Controller 1
J1939 61442 ETC1 8 9 Electronic Transmission Controller 1
J1939 61443 EEC2 8 10 Electronic Engine Controller 2
J1939 61444 EEC1 8 8 Electronic Engine Controller 1
J1939 61445 ETC2 8 5 Electronic Transmission Controller 2
J1939 61446 EAC1 8 10 Electronic Axle Controller 1
J1939 61447 FLI1 8 4 Forward Lane Image urgent msg
J1939 61448 HPG 8 4 Hydraulic Pressure Governor Info
J1939 61449 VDC2 8 6 Vehicle Dynamic Stability Control 2
J1939 61450 EGF1 8 2 Engine Gas Flow Rate
J1939 61451 ESC1 8 7 Electronic Steering Control
J1939 61452 ETC8 8 1 Electronic Transmission Controller #8
J1939 61453 LOI 8 9 Land Leveling System Operational Inf...
J1939 61454 AT1IG1 8 10 Aftertreatment 1 Intake Gas 1
J1939 61455 AT1OG1 8 10 Aftertreatment 1 Outlet Gas 1
J1939 61456 AT2IG1 8 10 Aftertreatment 2 Intake Gas 1
J1939 61457 AT2OG1 8 10 Aftertreatment 2 Outlet Gas 1
J1939 61458 FWSS1 8 4 Fifth Wheel Smart Systems 1
Name Byte Pos Bit Pos Len Parameter Name Type Byte Order Scaling Offset Units Min Val Max Val Ref Count
2928 Axle Location 3 1 8 Axle Location Unsigned Little Endian 1 0 bit 0 255 1
2927 Actual Inner wheel steering angle 1 1 16 Actual Inner wheel steering angle Unsigned Little Endian 0.003906 -125 deg -125 125 1
2926 Type of Steering Transmission 6 1 4 Type of Steering Transmission Unsigned Little Endian 1 0 bit 0 15 1
2925 Type of Steering Forces 5 5 4 Type of Steering Forces Unsigned Little Endian 1 0 bit 0 15 1
2924 Steering Type 5 1 4 Steering Type Unsigned Little Endian 1 0 bit 0 15 1
2923 Status of Steering Axle 4 1 4 Status of Steering Axle Unsigned Little Endian 1 0 bit 0 15 1
2922 Steerable Lift Axle Lowering Inhibit 4 5 2 Steerable Lift Axle Lowering Inhibit Unsigned Little Endian 1 0 bit 0 3 1

Modifying Packet Properties

To modify **Packet** properties simply right click on the packet and select **[Properties]** on the drop down menu by left clicking the mouse on the selection as illustrated below.

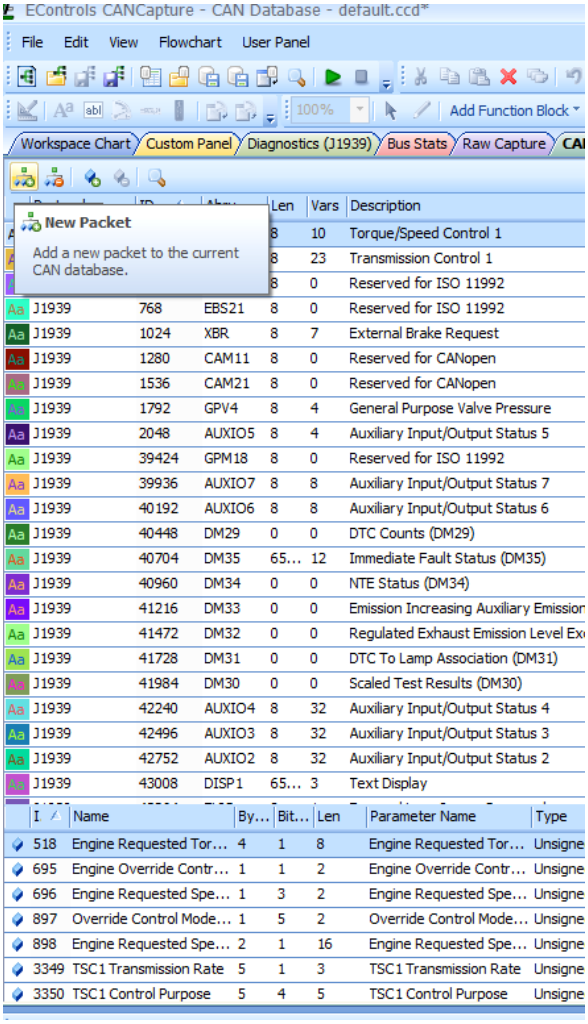

EControls CANCapture - CAN Database - default.ccd*
File Edit View Flowchart User Panel
Add Function Block
Workspace Chart
Custom Panel
Diagnostics (J1939)
Bus Stats
CAN Database - default.ccd*
Protocol ID Abrv Len Vars Description
J1939 59392 ACKM 8 9 Acknowledgment Message
J1939 59904 RQST 3 1 Request
J1939 60160 TP.DT 8 2 Transport Protocol - Data Transfer
J1939 60416 TP.CM.xx 8 16 Transport Protocol - Connection Mgmt
J1939 60672 N.xx 65... 0 Network Layer
J1939 60928 AC 8 1 Address Claimed
J1939 61440 ERC1 8 13 Electronic Retarder Controller 1
J1939 61441 EBC1 8 22 Electronic Brake Controller 1
J1939 61442 ETC1 8 9 Electronic Transmission Controller 1
J1939 61443 EEC2 8 10 Electronic Engine Controller 2
J1939 61444 EEC1 8 8 Electronic Engine Controller 1
J1939 61445 ETC2 8 5 Electronic Transmission Controller 2
J1939 61446 EAC1 8 10 Electronic Axle Controller 1
J1939 61447 FLI1 8 4 Forward Lane Image urgent msg
J1939 61448 HPG 8 4 Hydraulic Pressure Governor Info
J1939 61449 VDC2 8 6 Vehicle Dynamic Stability Control 2
J1939 61450 EGF1 8 2 Engine Gas Flow Rate
J1939 8 7 Electronic Steering Control
J1939 8 1 Electronic Transmission Controller #8
J1939 8 9 Land Leveling System Operational Inf...
J1939 8 10 Aftertreatment 1 Intake Gas 1
J1939 8 10 Aftertreatment 1 Outlet Gas 1
J1939 8 10 Aftertreatment 2 Intake Gas 1
J1939 8 10 Aftertreatment 2 Outlet Gas 1
J1939 8 4 Fifth Wheel Smart Systems 1
New Packet
Delete Packet
Insert Variable
Watch
Search Database
Properties
I Name Byte Pos Bit Pos Len Parameter Name
2928 Axle Location 3 1 8 Axle Location
2927 Actual Inner wheel steering angle 1 1 16 Actual Inner whe
2926 Type of Steering Transmission 6 1 4 Type of Steering
2925 Type of Steering Forces 5 5 4 Type of Steering
2924 Steering Type 5 1 4 Steering Type
2923 Status of Steering Axle 4 1 4 Status of Steerir

The packet properties window will now open displaying the details of the packet. You may customize the packet by changing the color of the **Text** and **Background** by highlighting your selection by left clicking on either **Text** or **Background** and then left clicking on the **[….]** button at the end of the **Color Properties** bar and selecting a color from the **Standard** or **Custom** color pallet as illustrated below. This is extremely helpful when one is trying to identify a packet when viewing a raw capture of all packets being transmitted on the CAN bus. When you are satisfied with the color choice left click the mouse on the **[OK]** button to accept them. If you want to discard your changes and return to the previous menu left click on the **[Cancel]** button**.**

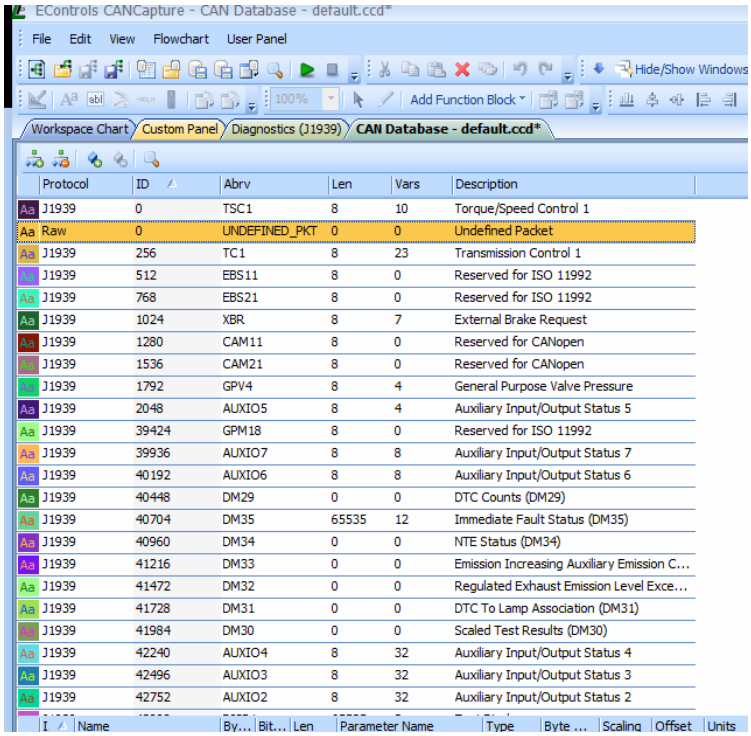


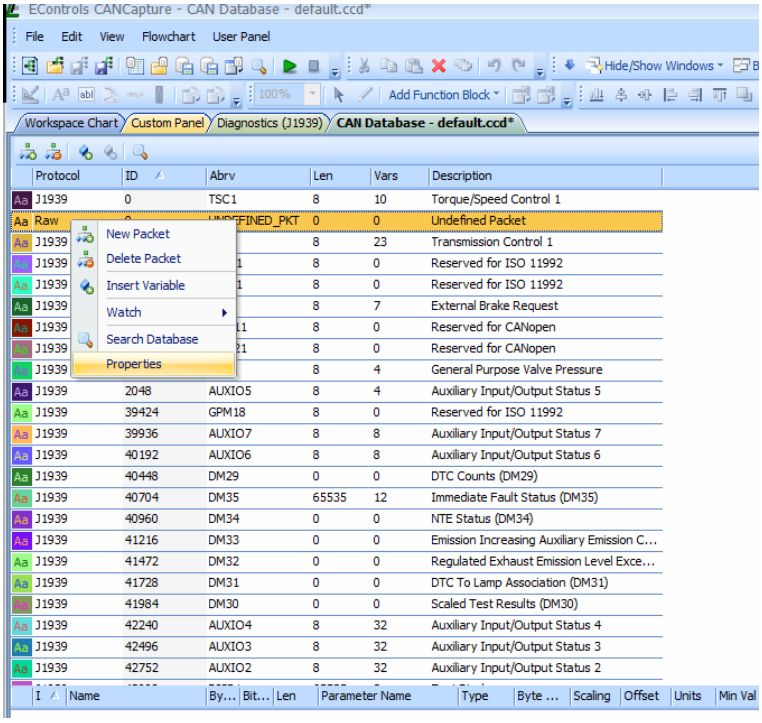
Adding a new Packet to the Database

You may **Add** a **New Packet** to the database by simply left clicking on the **New Packet** icon on the tool bar menu as illustrated below.

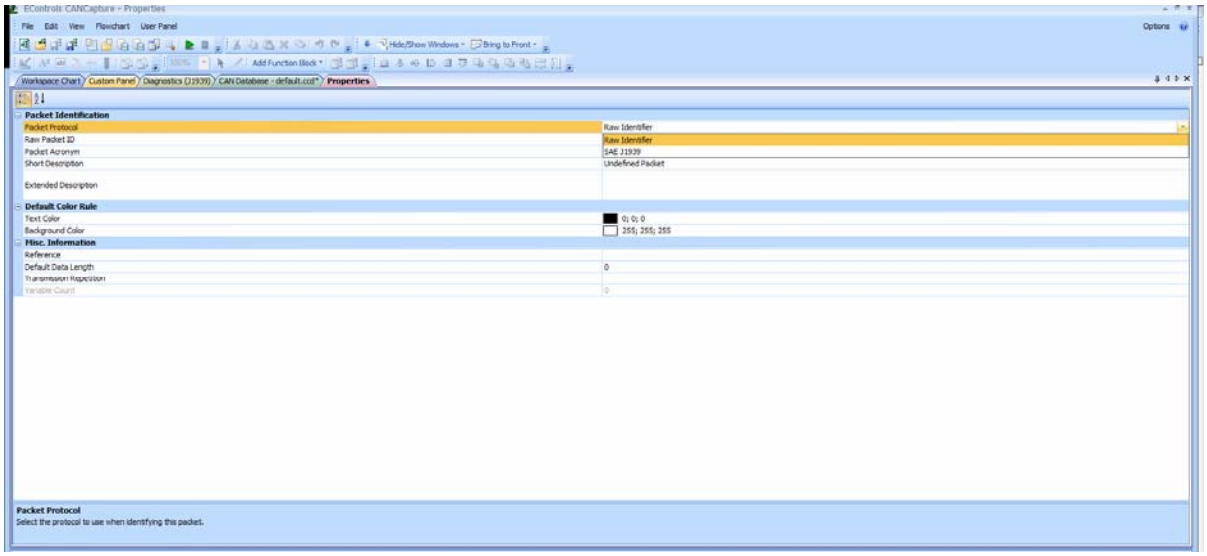

EControls CANCapture - CAN Database - default.ccd*
File Edit View Flowchart User Panel
Add Function Block
Workspace Chart Custom Panel Diagnostics (J1939) Bus Stats Raw Capture
New Packet
Add a new packet to the current CAN database.
Len Vars Description
8 10 Torque/Speed Control 1
8 23 Transmission Control 1
8 0 Reserved for ISO 11992
J1939 768 EBS21 8 0 Reserved for ISO 11992
J1939 1024 XBR 8 7 External Brake Request
J1939 1280 CAM11 8 0 Reserved for CANopen
J1939 1536 CAM21 8 0 Reserved for CANopen
J1939 1792 GPV4 8 4 General Purpose Valve Pressure
J1939 2048 AUXIO5 8 4 Auxiliary Input/Output Status 5
J1939 39424 GPM18 8 0 Reserved for ISO 11992
J1939 39936 AUXIO7 8 8 Auxiliary Input/Output Status 7
J1939 40192 AUXIO6 8 8 Auxiliary Input/Output Status 6
J1939 40448 DM29 0 0 DTC Counts (DM29)
J1939 40704 DM35 65... 12 Immediate Fault Status (DM35)
J1939 40960 DM34 0 0 NTE Status (DM34)
J1939 41216 DM33 0 0 Emission Increasing Auxiliary Emission
J1939 41472 DM32 0 0 Regulated Exhaust Emission Level Ex
J1939 41728 DM31 0 0 DTC To Lamp Association (DM31)
J1939 41984 DM30 0 0 Scaled Test Results (DM30)
J1939 42240 AUXIO4 8 32 Auxiliary Input/Output Status 4
J1939 42496 AUXIO3 8 32 Auxiliary Input/Output Status 3
J1939 42752 AUXIO2 8 32 Auxiliary Input/Output Status 2
J1939 43008 DISP1 65... 3 Text Display
I Name By... Bit... Len Parameter Name Type
518 Engine Requested Tor... 4 1 8 Engine Requested Tor... Unsigne
695 Engine Override Contr... 1 1 2 Engine Override Contr... Unsigne
696 Engine Requested Spe... 1 3 2 Engine Requested Spe... Unsigne
897 Override Control Mode... 1 5 2 Override Control Mode... Unsigne
898 Engine Requested Spe... 2 1 16 Engine Requested Spe... Unsigne
3349 TSC1 Transmission Rate 5 1 3 TSC1 Transmission Rate Unsigne
3350 TSC1 Control Purpose 5 4 5 TSC1 Control Purpose Unsigne

A new line with your new **Packet** will be automatically inserted. You may now edit the properties of you new packet by right clicking on the new packet and then selecting **[Properties]** on the drop down menu by left clicking the mouse on the selection as illustrated below.


EControls CANCapture - CAN Database - default.ccd*
File Edit View Flowchart User Panel
Hide/Show Windows
Add Function Block
Workspace Chart
Custom Panel
Diagnostics (J1939)
CAN Database - default.ccd*
Protocol ID Abrv Len Vars Description
J1939 0 TSC1 8 10 Torque/Speed Control 1
Raw 0 UNDEFINED_PKT 0 0 Undefined Packet
J1939 256 TC1 8 23 Transmission Control 1
J1939 512 EBS11 8 0 Reserved for ISO 11992
J1939 768 EBS21 8 0 Reserved for ISO 11992
J1939 1024 XBR 8 7 External Brake Request
J1939 1280 CAM11 8 0 Reserved for CANopen
J1939 1536 CAM21 8 0 Reserved for CANopen
J1939 1792 GPV4 8 4 General Purpose Valve Pressure
J1939 2048 AUXIO5 8 4 Auxiliary Input/Output Status 5
J1939 39424 GPM18 8 0 Reserved for ISO 11992
J1939 39936 AUXIO7 8 8 Auxiliary Input/Output Status 7
J1939 40192 AUXIO6 8 8 Auxiliary Input/Output Status 6
J1939 40448 DM29 0 0 DTC Counts (DM29)
J1939 40704 DM35 65535 12 Immediate Fault Status (DM35)
J1939 40960 DM34 0 0 NTE Status (DM34)
J1939 41216 DM33 0 0 Emission Increasing Auxiliary Emission C...
J1939 41472 DM32 0 0 Regulated Exhaust Emission Level Exce...
J1939 41728 DM31 0 0 DTC To Lamp Association (DM31)
J1939 41984 DM30 0 0 Scaled Test Results (DM30)
J1939 42240 AUXIO4 8 32 Auxiliary Input/Output Status 4
J1939 42496 AUXIO3 8 32 Auxiliary Input/Output Status 3
J1939 42752 AUXIO2 8 32 Auxiliary Input/Output Status 2
I Name By... Bit... Len Parameter Name Type Byte ... Scaling Offset Units

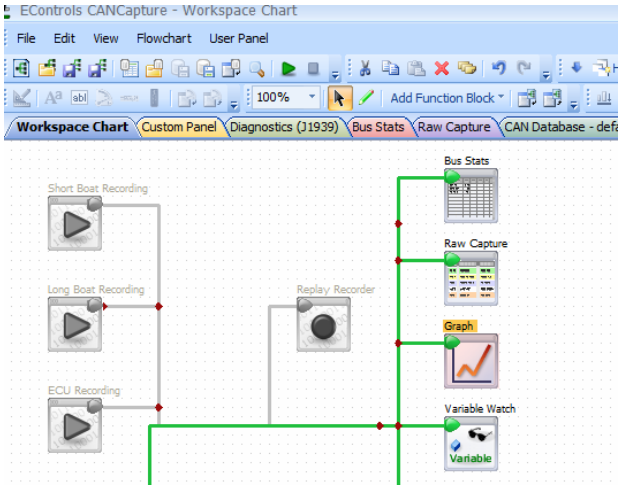


You may edit the various properties of your new **Packet** such as selecting **Raw Identifier** or **J1939** by left clicking on the [▼] **Packet Protocol** bar and then left clicking again on the selection as illustrated below.

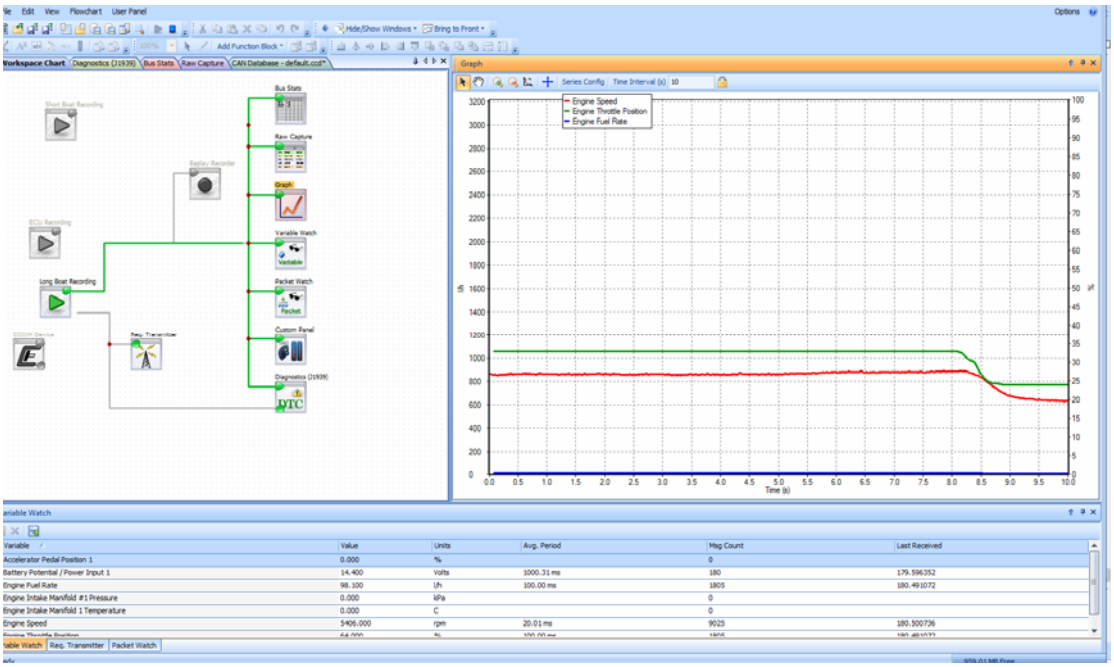


Graph Function Block

To enable the graphing function left click on the **Graph Functional Block** as illustrated below. **CANCapture** is capable of graphing data in real time as it is captured or from a previously recorded data session.

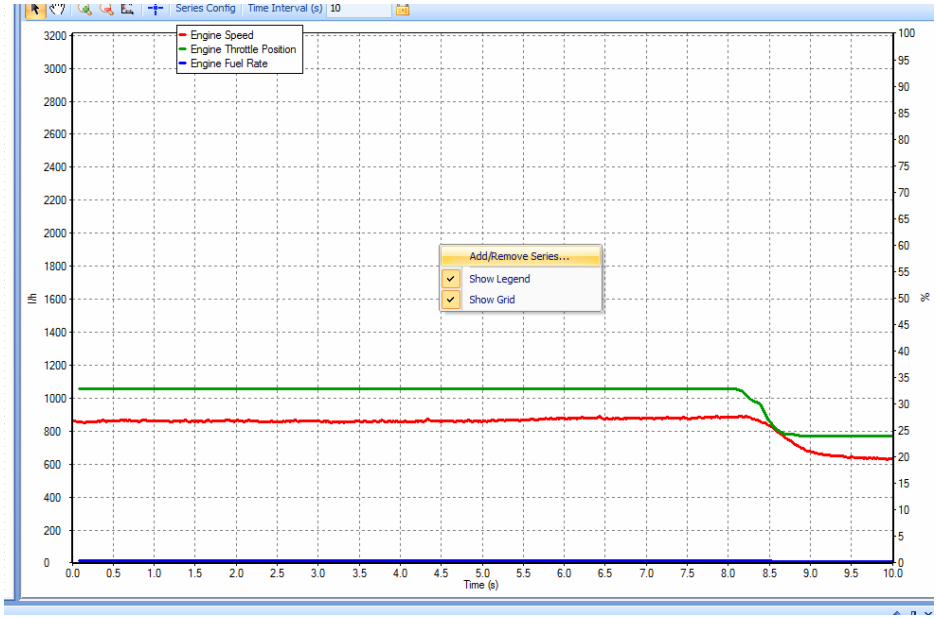


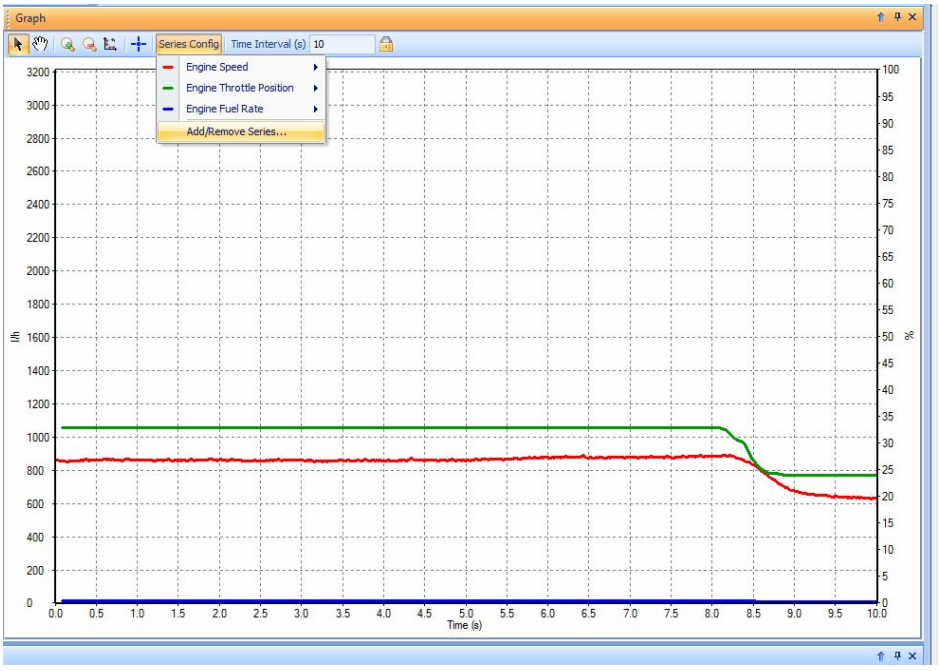
The graph window will now appear.



Adding or removing a series to your graph

You may **Add** or **Remove** a data series to your graph by either right clicking on the graph and selecting **[Add/Remove Series…]** from the drop down menu by left clicking the mouse on the selection or by selecting **[Series Config]** from the **Graph Window** tool bar menu as illustrated below.



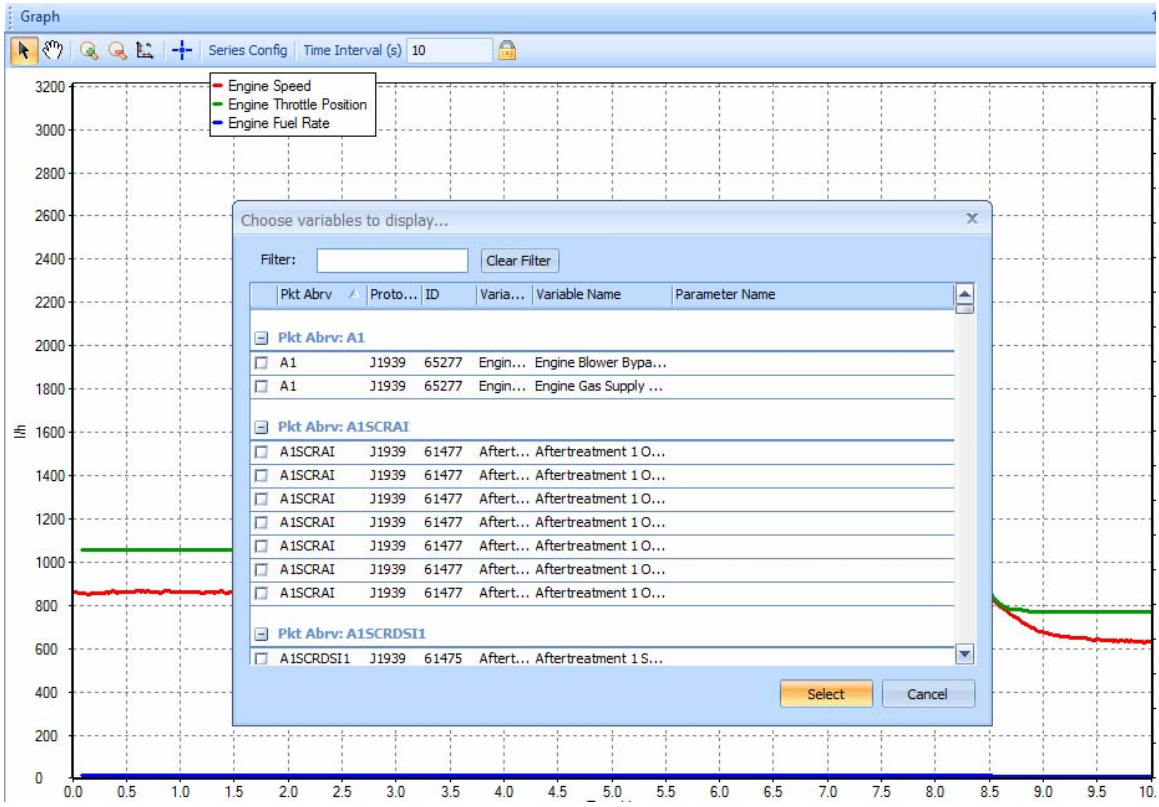


Selecting Variable(s) to Graph

You may now select the **Variable**(s) you wish to display on the graph from the list that is displayed by left clicking on the selection box to the left of the **Variable** you wish to display.

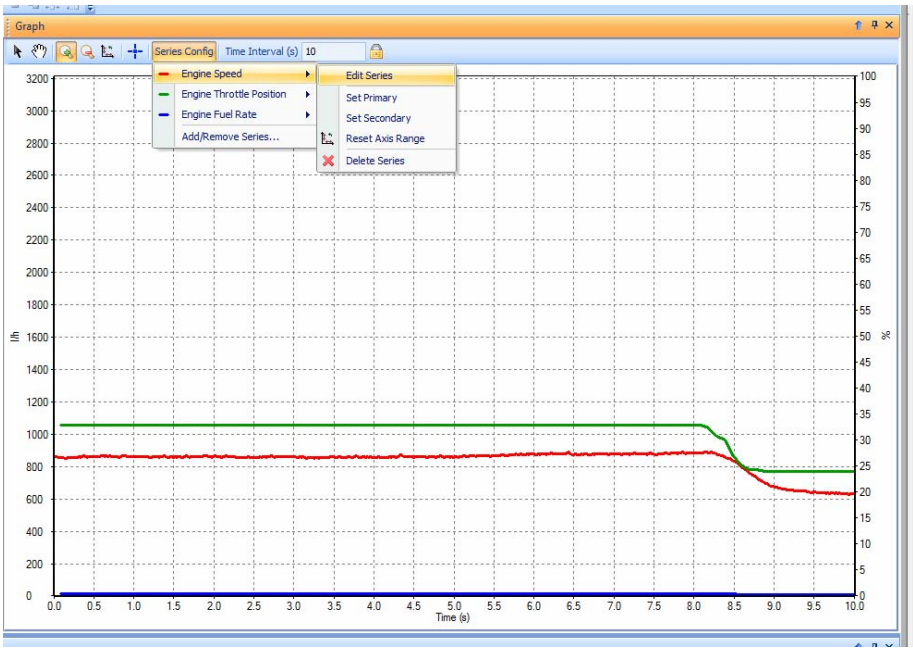
To remove a **Variable** from the graph left click on the box to remove the selection check mark **[**√**]** from the box.

When you have completed selecting the **Variable**(s) you wish to display on the graph left click on the **[Select]** button. If you wish to cancel this process and return to the graph window left click on the **[Cancel]** button.



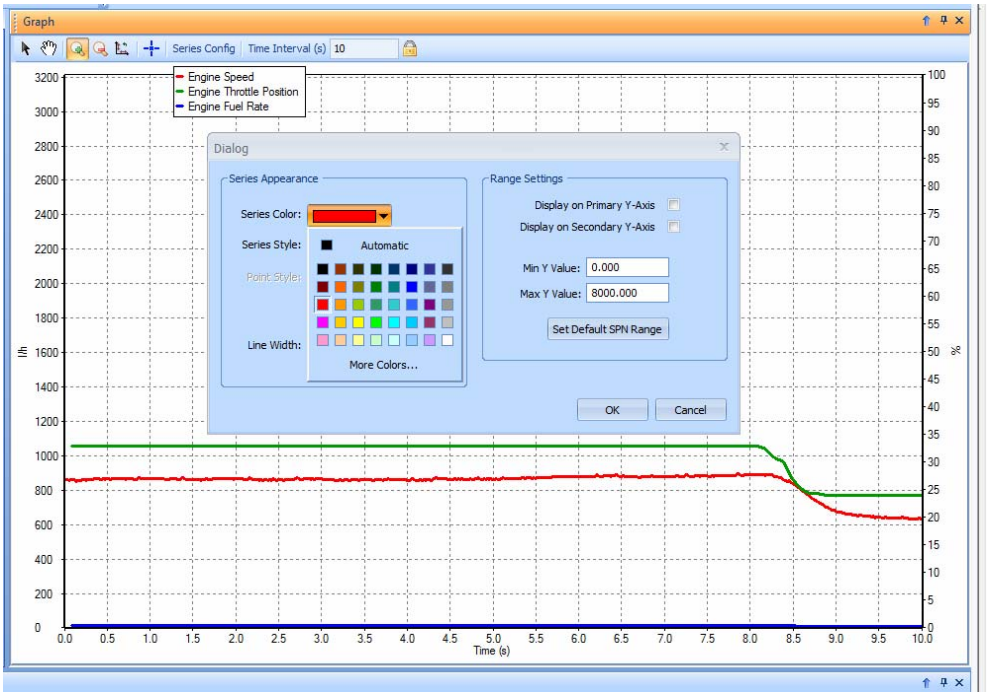
Editing a Series for Graphing

You may edit a data series on the graph by selecting the **[Series Config]** from the **Graph** toolbar menu, selecting the data series you wish to edit and selecting **[Edit Series]** as illustrated below.



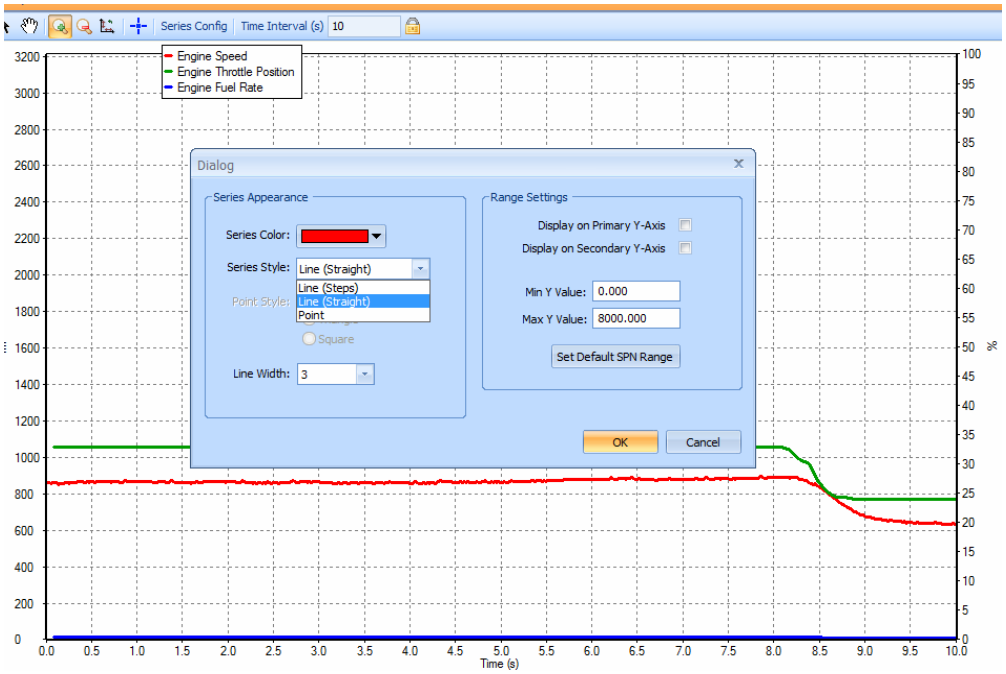
Setting the Data Series Display Color

You may set the color you wish the data series to be displayed in on the graph by selecting the specific color from the drop down menus on the **Series Color:** selection on the **Dialog** window under **Series Appearance** as illustrated below.



Selecting Line Style for the Graph

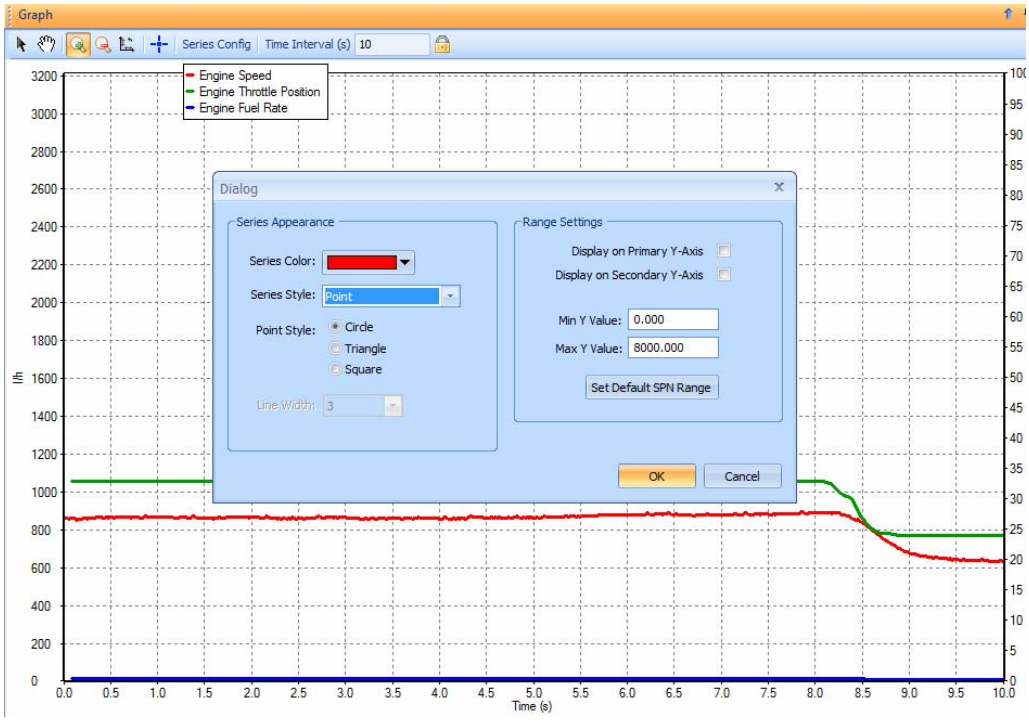
You may select the line style you wish to display the data series on the plot by selecting **Series Style:** from the drop down menu on the **Dialog** window under **Series Appearance** as illustrated below. The choices are **Line (Steps)**, **Line (Straight)**, or **Point**.



When you are satisfied with your choices left click on the **[OK]** button to accept them. If you want to discard your changes and return to the previous menu left click on the **[Cancel]** button.

Selecting a Point Style Graph

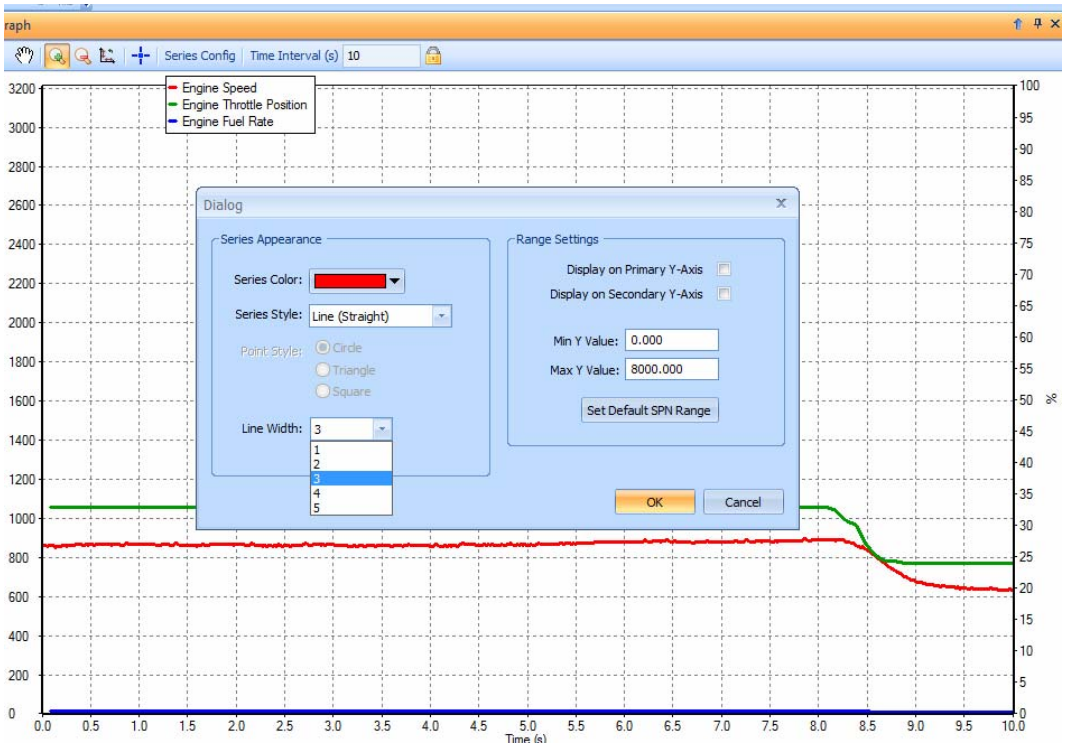
You may select the **Point Style** you wish to display by selecting it from the drop down menu on **Point Style:** on the **Dialog** window as illustrated below. The points may be displayed as **Circles**, **Triangles** or **Squares**.



When you are satisfied with your choices left click on the **[OK]** button to accept them. If you want to discard your changes and return to the previous menu left click on the **[Cancel]** button.

Selecting the Line Width for a series displayed as a Line Graph

You may select the **Line Width** for a data series that is being displayed as a line graph by selecting the relative line size from the drop down menu on the **Dialog** Window as illustrated below. The choices are from **1** to **5**.

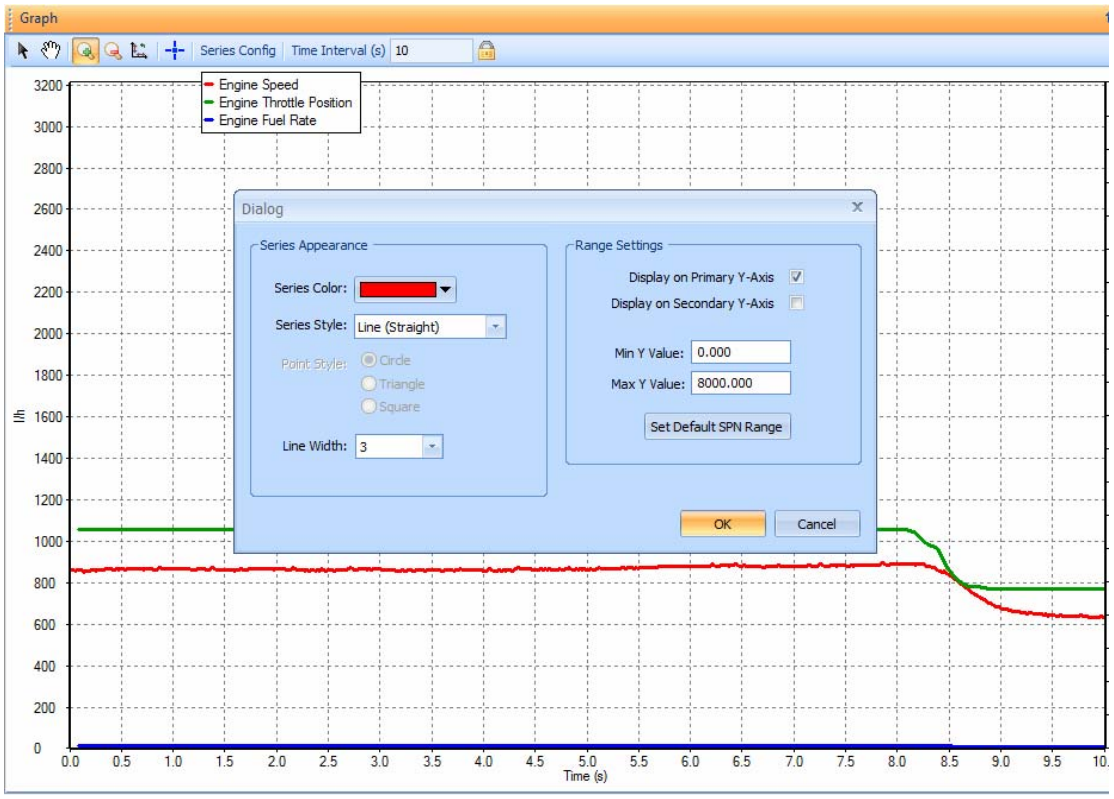


When you are satisfied with your choices left click on the **[OK]** button to accept them. If you want to discard your changes and return to the previous menu left click on the **[Cancel]** button.

Selecting the Range Setting for the Data Series

You may select the various **Range Settings** for the data series by making your selections under the **Range Settings** of the **Dialog** Window.

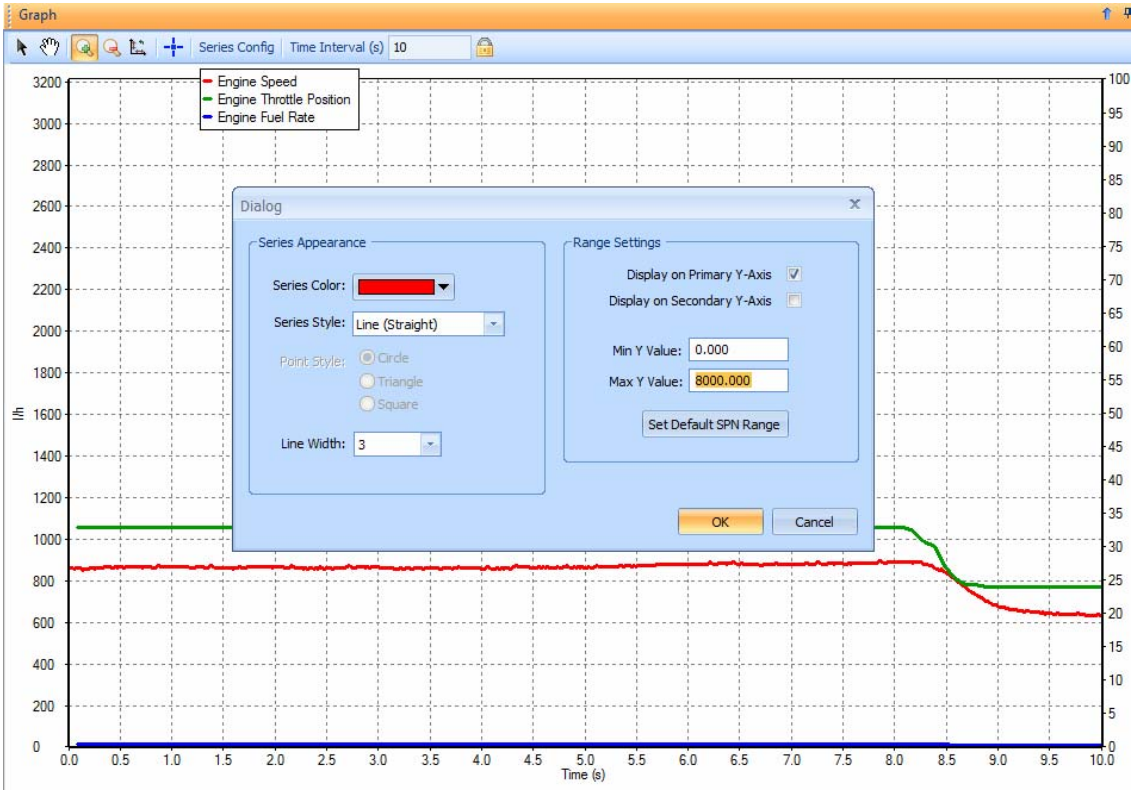
You may choose to display the range for the data series on the **Primary Y-Axis** or the **Secondary Y-Axis** by left clicking on the selection circle following the choice. A check mark **[**√**]** will appear in the selection box upon selection acceptance as illustrated below.



When you are satisfied with your choices left click on the **[OK]** button to accept them. If you want to discard your changes and return to the previous menu left click on the **[Cancel]** button.

Setting the Minimum and Maximum Range Values for a Data Series

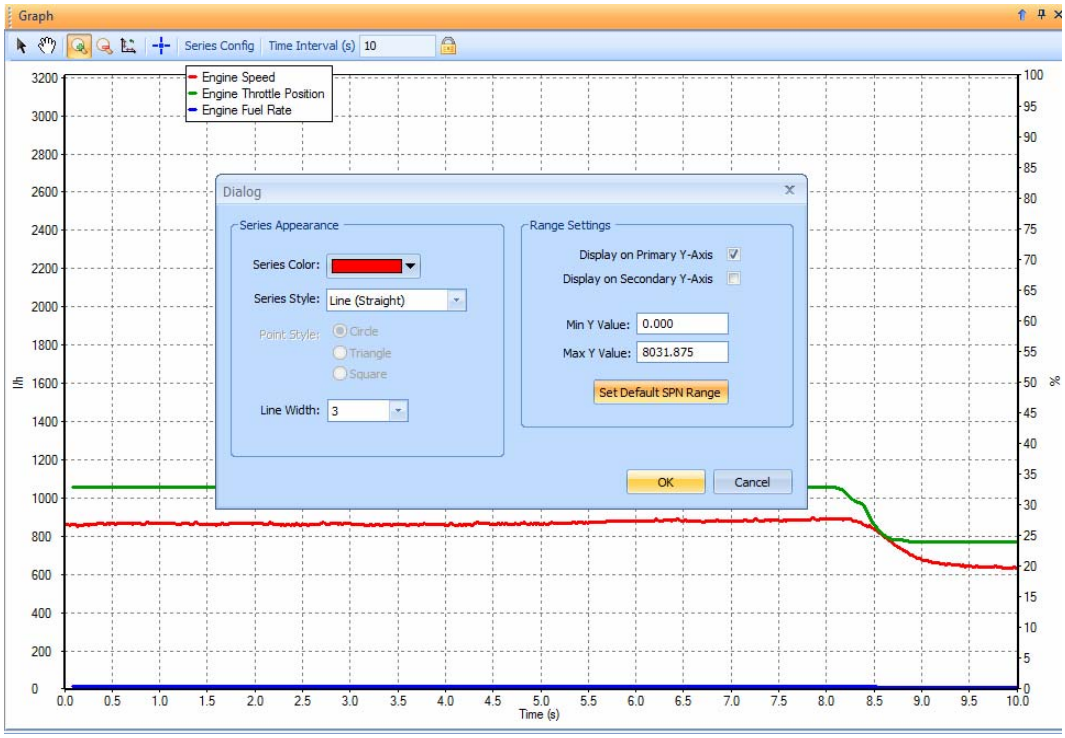
You may set the **Minimum** and **Maximum** values for the data series that is being displayed on the graph by entering the values on the **Dialog** window under the **Range Settings** in the **Min Y Value:** and **Max Y value:** as illustrated below.



When you are satisfied with your setting you may left click the mouse on the **[OK]** button if you want to discard your changes and return to the previous window left click the mouse on the [Cancel] button.

Selecting the Default SPN Range Value

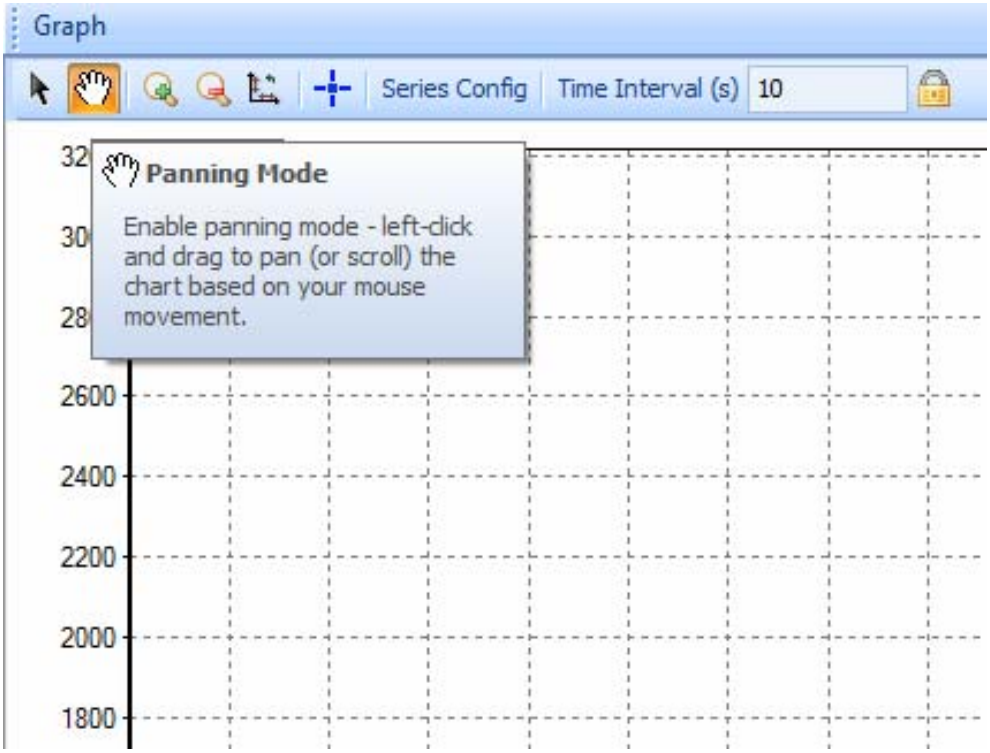
Alternatively you can select to use the default **SPN range** values by selecting the **[Set Default SPN Range] selection button** on the **Dialog** window under **Range Settings**. The **Default SPN Range** is retrieved from the CAN database for the respective **SPN.**



After you have completed selecting all the display parameters for the data series you may accept the selections and exit the **Dialog** window by left clicking on the **[OK]** button. If you wish to discard your entries and exit the **Dialog** window left click on **[Cancel]** button.

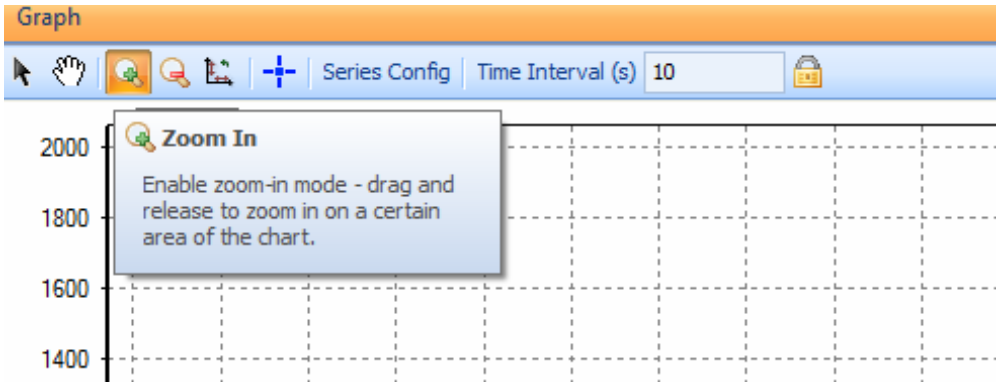
Using the Panning Tool on the Graph Window

You may enable the **Panning Tool** by selecting the Panning Mode icon from the **Graph** window toolbar and left clicking and holding down the left mouse button while scrolling through the graph as illustrated below.



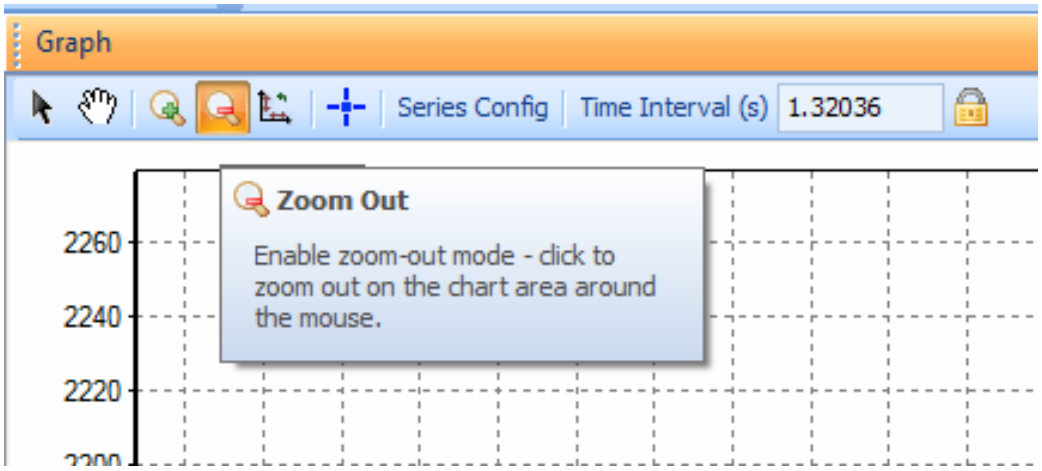
Zooming in on a specific area of the graph

You may **Zoom** in on a specific area of the graph by selecting the **Green Zoom In** icon on the **Graph** window tool bar and then selecting and area you wish to zoom by clicking and dragging the left mouse button as illustrated below.



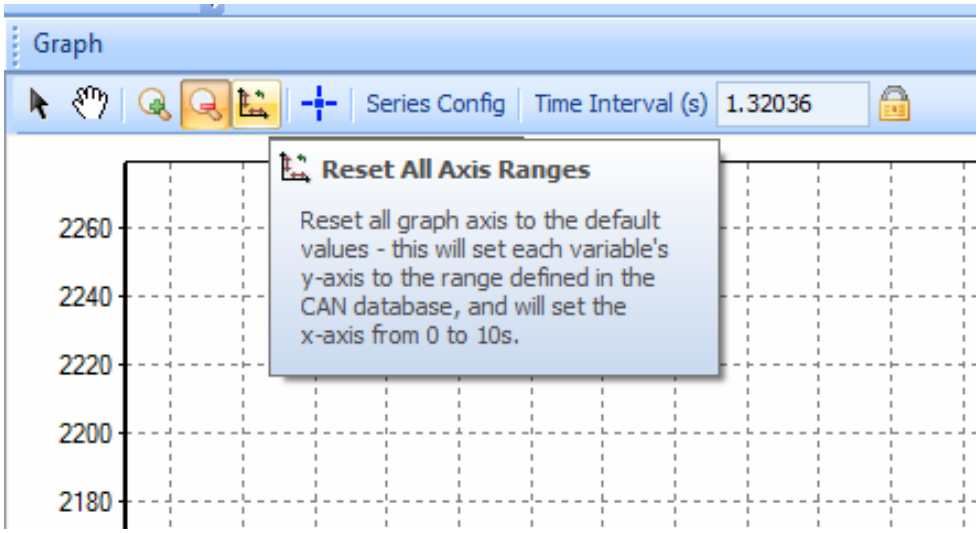
Zooming Out

You may **Zoom Out** on the graph by selecting the **Red Zoom Out Icon** on the **Graph** window tool bar menu and left clicking on the graph as illustrated below.



Resetting All Graph Ranges to Default Values

You may **Reset All Graph Ranges to Default Values** by selecting the **Reset Graph Axis Icon** on the **Graph** window tool bar menu as illustrated below. All **Graph Axis** will be **Reset** to the default values defined in the CAN database.


Graph
Series Config
Time Interval (s)
1.32036
Reset All Axis Ranges
Reset all graph axis to the default values - this will set each variable's y-axis to the range defined in the CAN database, and will set the x-axis from 0 to 10s.
2260
2240
2220
2200
2180

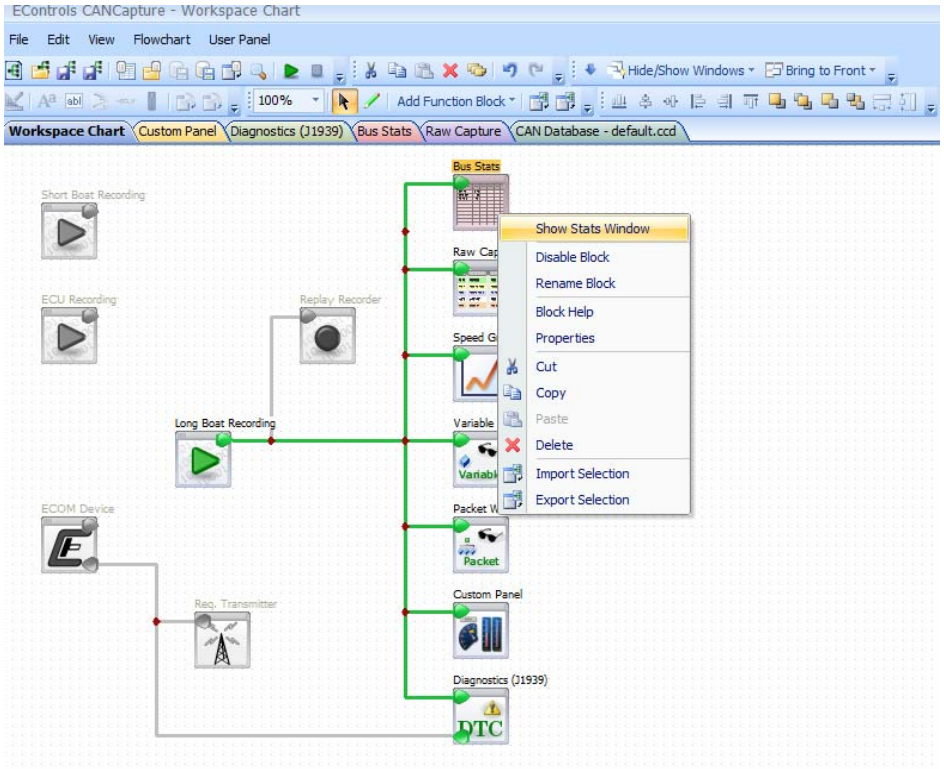
Enabling and Locating Display Cursors

You may **Enable Display Cursors** to aid in the measurement of any two points on the graph either in the **X** or **Y** axis by selecting the **[┼] Display Cursors Icon** from the **Graph** window tool bar menu as illustrated below. After enabling you may locate the cursors using the right mouse button. The **Cursor Window** will display the absolute value and the difference between the two cursors in both the X and Y axis illustrated as **dX** and **dY**.

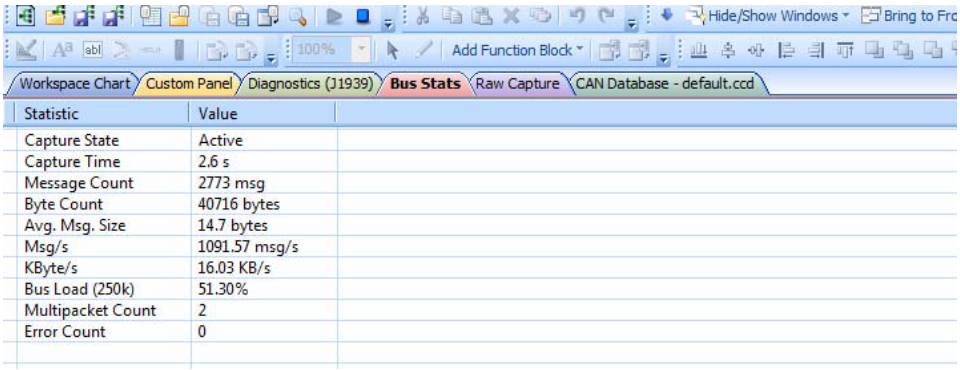
Note: The pointer icon must be selected in order to drag and move the cursors.

Bus Statistics Function Block

You may display the **CAN Bus Statistics Window** by right clicking on the **Bus Stats Functional Block** on the **Workspace Window** and selecting **[Show Stats Window]** by left clicking on the selection as illustrated below or by simply double clicking the left mouse button on the **Bus Stats Functional Block**.



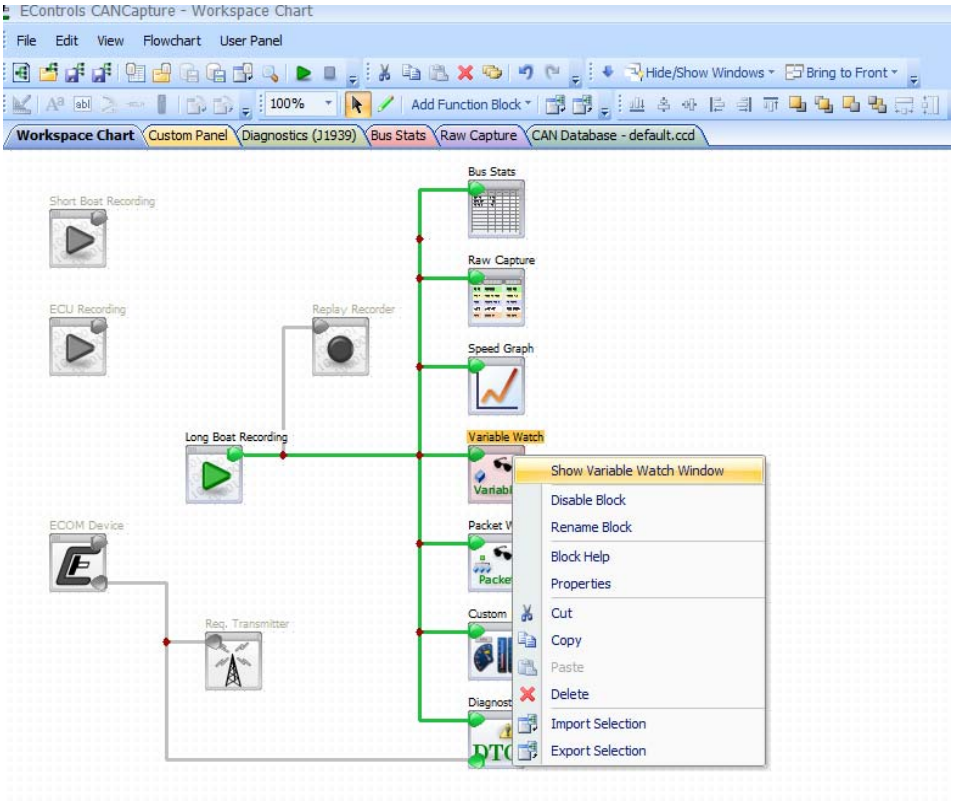
The **Bus Stats** window will now open displaying the current **Statistics** of the CAN Bus.



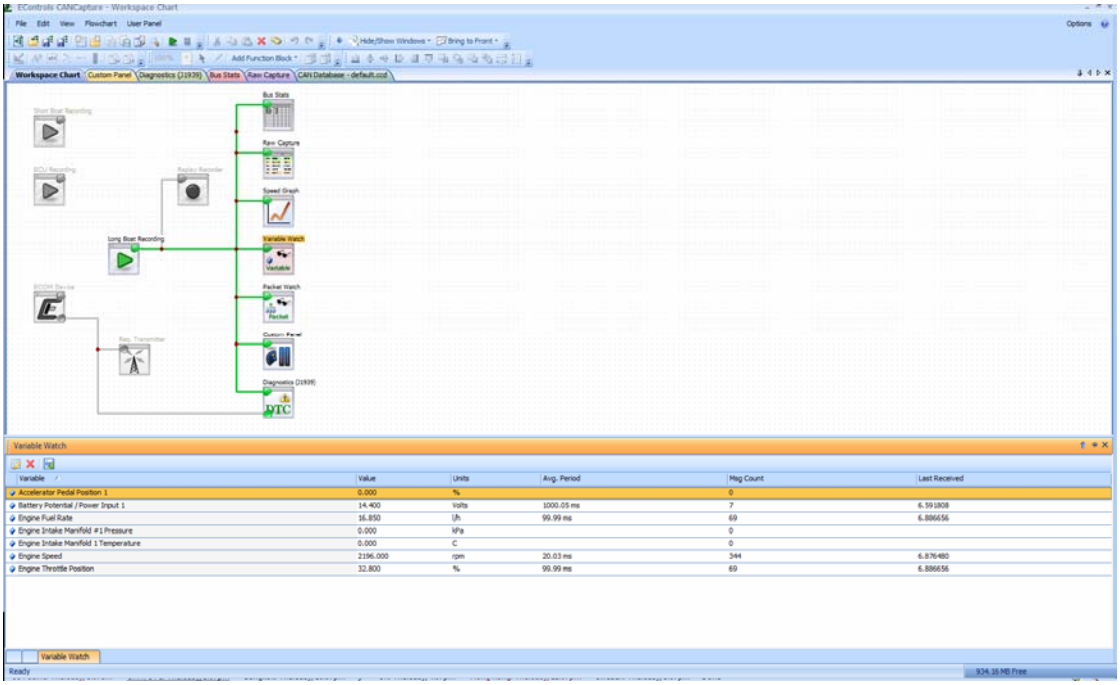
Statistic	Value
Capture State	Active
Capture Time	2.6 s
Message Count	2773 msg
Byte Count	40716 bytes
Avg. Msg. Size	14.7 bytes
Msg/s	1091.57 msg/s
KByte/s	16.03 KB/s
Bus Load (250k)	51.30%
Multipacket Count	2
Error Count	0

Variable Watch Function Block

You may open the **Variable Watch Window** by right clicking on the **Variable Watch Functional Block** and selecting **[Show Variable Watch Window]** by left clicking the mouse on the selection as illustrated below or by simply double clicking the **Variable Watch Functional Block** with the left mouse button.

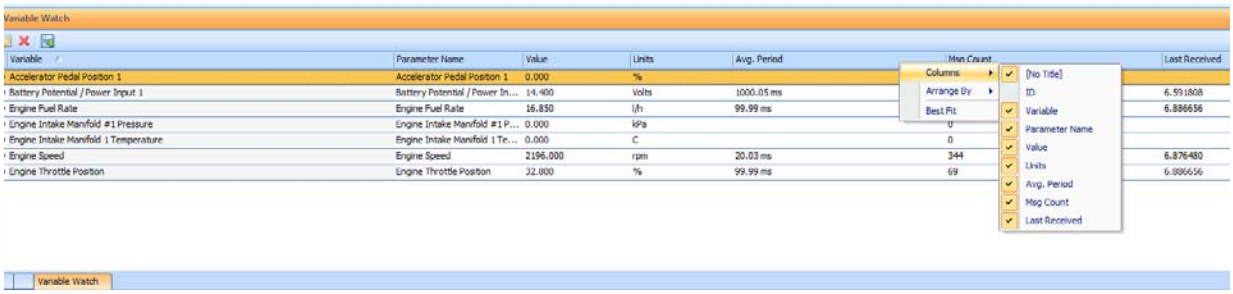


The **Variable Watch Window** will now appear and be selected.



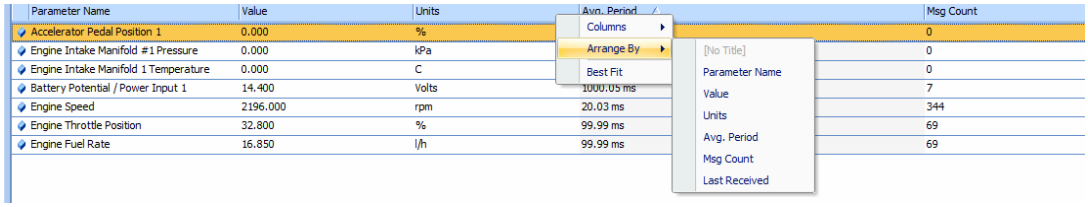
The Variable Watch Display Column Options

You may select the columns to display by right clicking on the display column headings and selecting **Columns** from the drop down menu by left clicking the mouse on the selection and then simply checking or un-checking the items you wish to display from the menu as illustrated below.



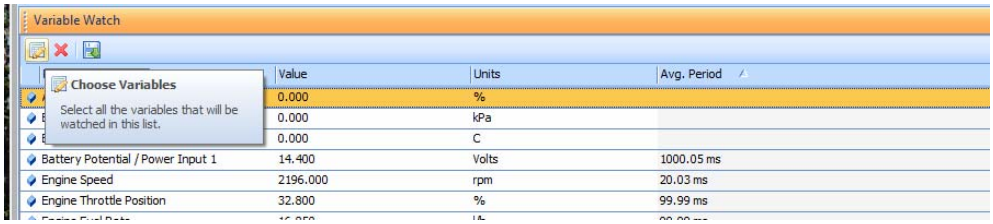
Selecting the Arrangement the Variable Watch Columns

You may select the **Arrangement** of the display columns by left clicking on the headings and selecting **[Arrange by ►]** from the drop down menu followed by the column you wish to sort as illustrated below and.

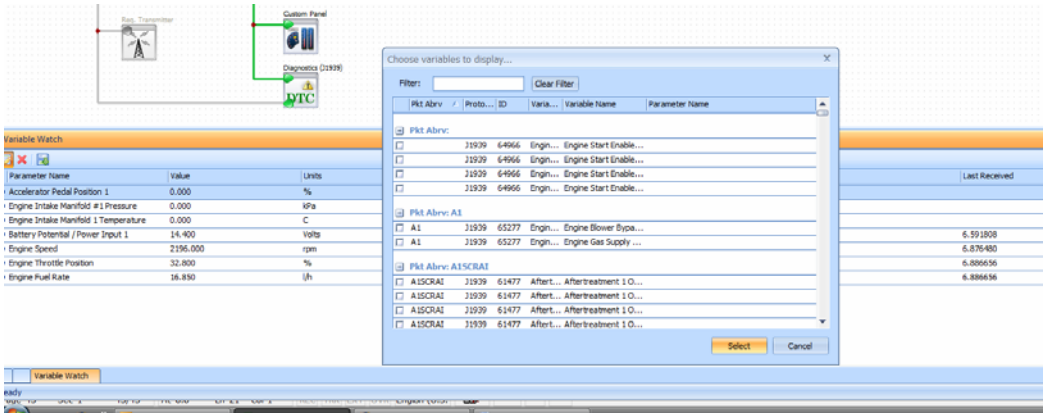


Selecting the variable you wish to display on Variable Watch

You may select the variable you wish to display on the **Variable Watch Window** by double clicking on the **Choose Variables Icon** on the **Variable Watch Window** tool bar as illustrated below.



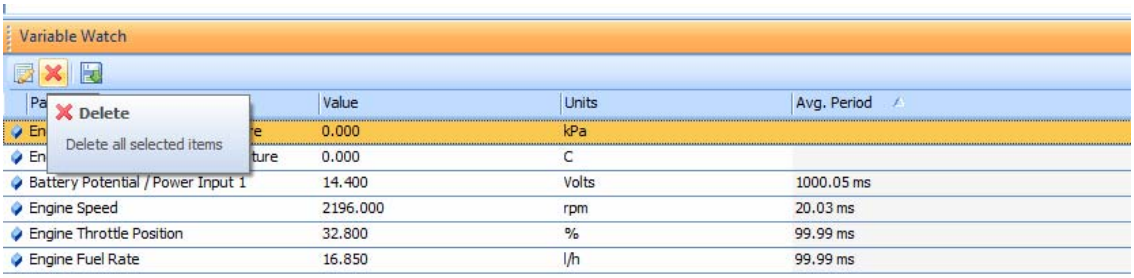
The following window will open allowing you to select the variables you wish to display on the **Variable Watch Window**.



You may now select or deselect the particular variable you wish to display by adding or omitting a check mark **[√]** on the selection box to the left of the variable and left clicking with the mouse button while the cursor is over the selection box. Once you are satisfied with your selections left click on the **[Select]** button to complete. If you wish to discard your selections and return to the **Variable Watch Window** simply left click on the **[Cancel]** button.

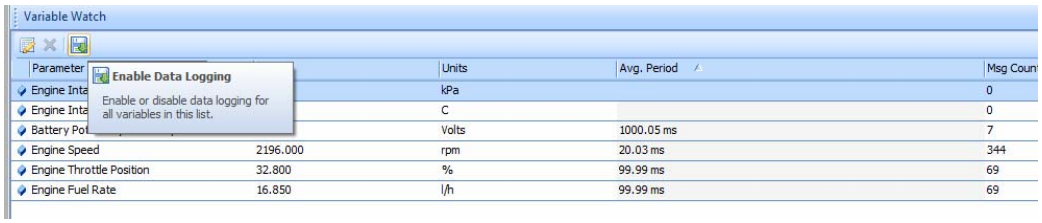
Deleting Selected Items from the Variable Watch Window

If you wish to delete items from the **Variable Watch Window** you may highlight the item by right clicking the particular item and either clicking the [X] **Delete Selected Items Icon** from the **Variable Watch Window** tool bar as illustrated below or by depressing the delete key on the keyboard.



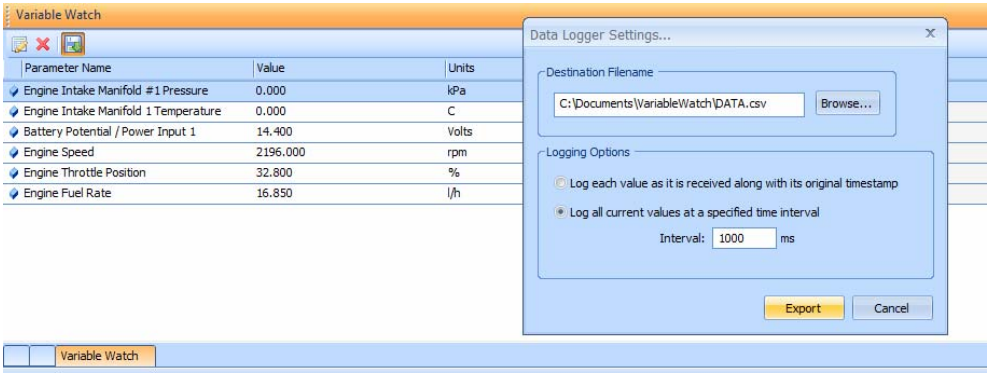
Enabling Data Logging from the Variable Watch Window

You may enable the data logging feature to save the data to a file of your choice by selecting the **Enable Data Logging Icon** from the **Variable Watch Window** toolbar as illustrated below. This will log the incoming data for all variables on the **Variable Watch Window** list to the file that you select.



Selecting the Destination File for Data Logging

The following window will open allowing you to select the file where you wish to save the data. The **Destination File** should be entered in the format as illustrated below.



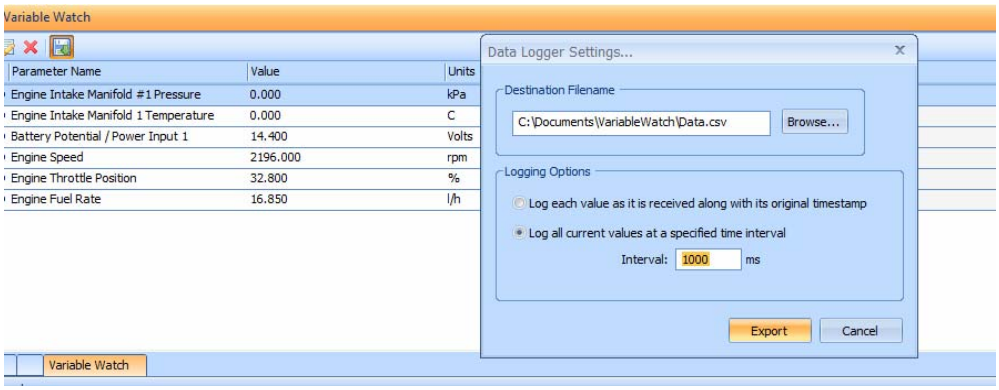
You may now enter the file name in the **Destination Filename** window on the **Data Logger Settings… Window** or select **[Browse…]** to locate a file you wish to save the data to. If you select browse the software will take you to your computer storage options allowing you to select the folder and if you wish select a unique filename for your data file. The data will be saved as a (*.csv) file. When you are satisfied with your settings left click on **[Export]** if you want to discard your changes and return to the previous menu left click on the **[Cancel]** button.

Variable Watch Data Logging Options

You may select the Data Logging Options. The options are:

- **Log each value as it is received along with its original timestamp**
- **Log all values at a specified time interval**

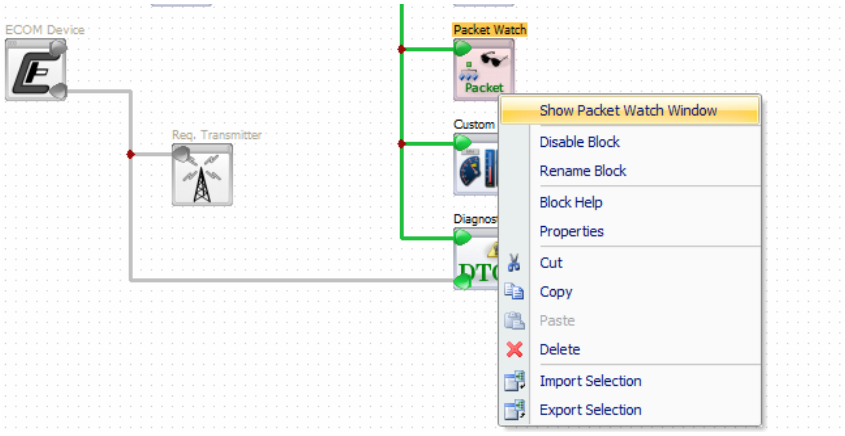
If you select **Log all values at a specified time interval** you may select the time interval in milliseconds by entering the value in the **Time Interval window** of the **Data Logging Options** window as illustrated below.



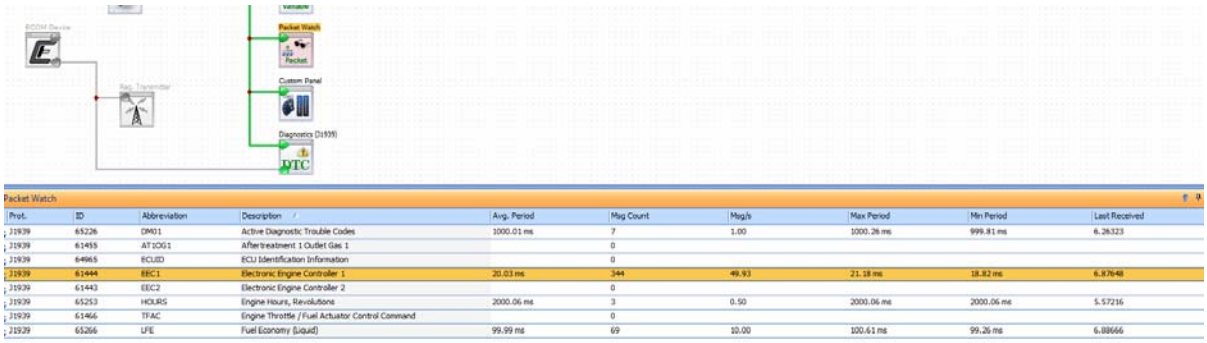
When you are satisfied with the location and options and you may select the **[Export]** button to start logging your data. If you want to discard all of your selections and return to the **Variable Watch Window** you may select the **[Cancel]** button by clicking with the left mouse button.

Packet Watch Function Block

To display the **Packet Watch Window** you may either right click on the **Packet Watch Functional Block** and select **[Show Packet Watch Window]** from the drop down menu as illustrated below or simply double left click on the **Packet Watch Functional Block**.

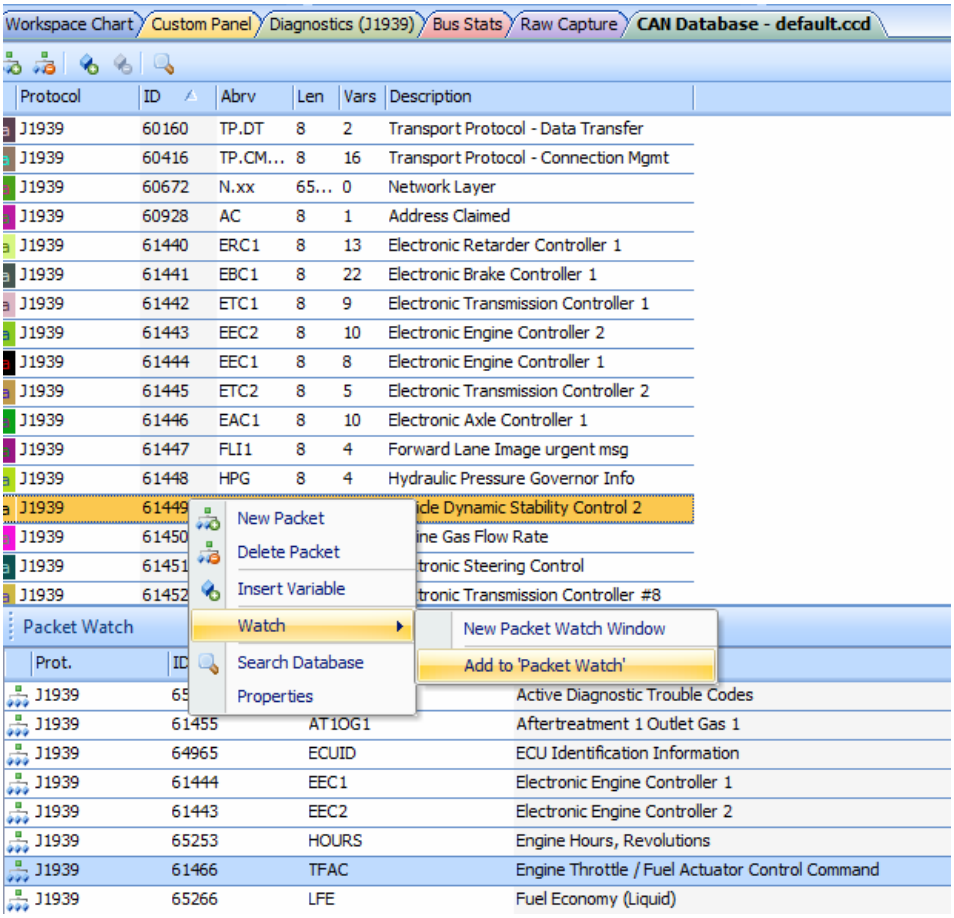


The **Packet Watch Window** will now open at the bottom of the screen as illustrated below.



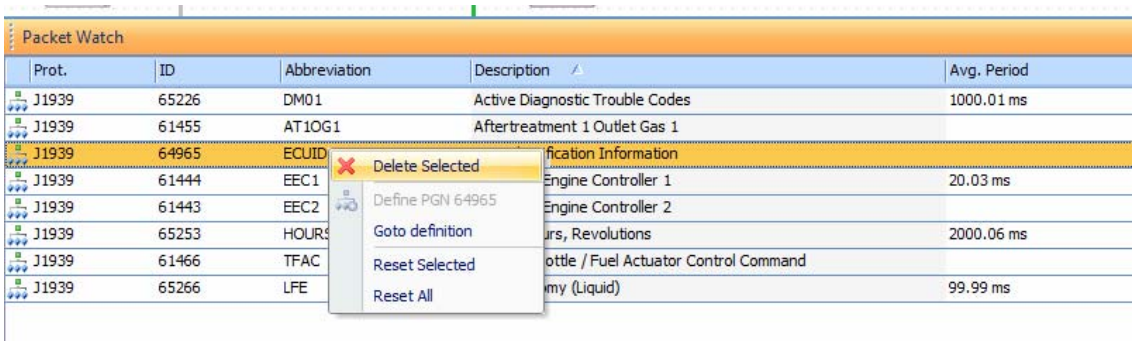
Adding New Packets to the Packet Watch Window

You may add new packets to the **Packet Watch Window** by opening the **CAN Database Window** and right clicking on the packet you wish to add to the **Packet Watch Window** and select [**Watch ►**] and then **[Add to 'Packet Watch']** on the drop down menu by as illustrated below.


Workspace Chart
Custom Panel
Diagnostics (J1939)
Bus Stats
Raw Capture
CAN Database - default.ccd
Protocol
ID
Abrv
Len
Vars
Description
J1939 60160 TP.DT 8 2 Transport Protocol - Data Transfer
J1939 60416 TP.CM... 8 16 Transport Protocol - Connection Mgmt
J1939 60672 N.xx 65... 0 Network Layer
J1939 60928 AC 8 1 Address Claimed
J1939 61440 ERC1 8 13 Electronic Retarder Controller 1
J1939 61441 EBC1 8 22 Electronic Brake Controller 1
J1939 61442 ETC1 8 9 Electronic Transmission Controller 1
J1939 61443 EEC2 8 10 Electronic Engine Controller 2
J1939 61444 EEC1 8 8 Electronic Engine Controller 1
J1939 61445 ETC2 8 5 Electronic Transmission Controller 2
J1939 61446 EAC1 8 10 Electronic Axle Controller 1
J1939 61447 FLI1 8 4 Forward Lane Image urgent msg
J1939 61448 HPG 8 4 Hydraulic Pressure Governor Info
J1939 61449
J1939 61450
J1939 61451
J1939 61452
New Packet
Delete Packet
Insert Variable
Watch
Search Database
Properties
New Packet Watch Window
Add to 'Packet Watch'
Packet Watch
Prot.
ID
J1939 Active Diagnostic Trouble Codes
J1939 61455 AT1OG1 Aftertreatment 1 Outlet Gas 1
J1939 64965 ECUID ECU Identification Information
J1939 61444 EEC1 Electronic Engine Controller 1
J1939 61443 EEC2 Electronic Engine Controller 2
J1939 65253 HOURS Engine Hours, Revolutions
J1939 61466 TFAC Engine Throttle / Fuel Actuator Control Command
J1939 65266 LFE Fuel Economy (Liquid)

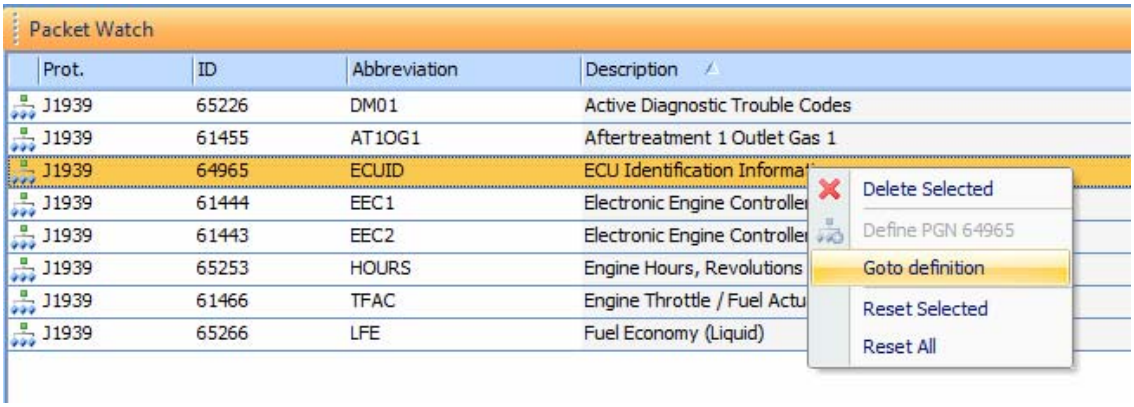
Deleting Packets from the Packet Watch Window

You may **Delete Packets** from the **Packet Watch Window** by highlighting the particular variable by right clicking with the mouse while the cursor is over the variable you wish to **Delete** and selecting and selecting **[X Delete Selected]** from the drop down menu by left clicking the mouse as illustrated below.



Finding the Packet Definition

You may obtain the **Packet Definition** by highlighting the specific **Packet** by right clicking the P**acket** and selecting **[Goto Definition]** from the drop down menu as illustrated below.

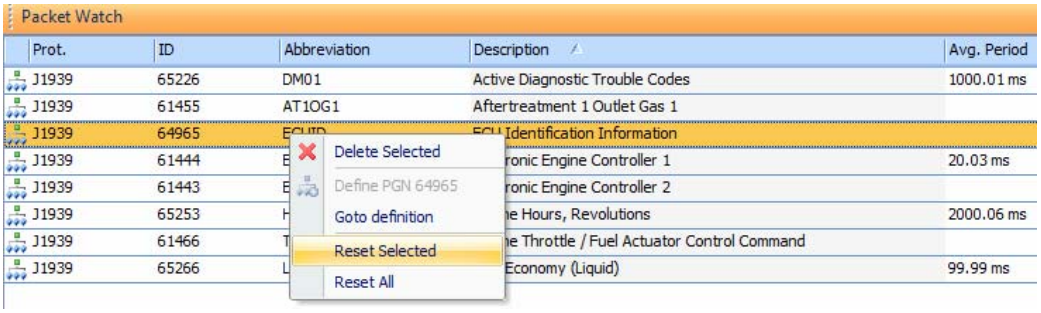


The **CAN Database** will now open allowing you to obtain the definition for the specific packet.

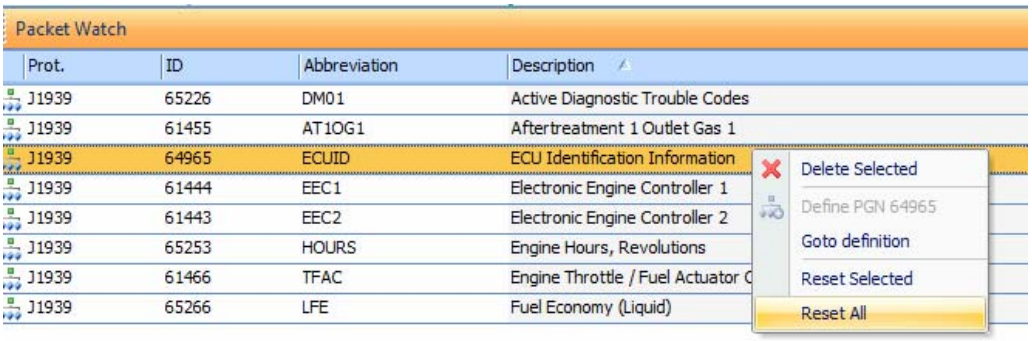
Resetting Packets

You may **Reset** the data of a specific packet or **Reset** the data for **all packets** on the **Packet Watch Window** by highlighting the specific packet by right clicking the mouse on the packet and selecting either **[Reset Selected]** or **[Reset All]** from the drop down menu by left clicking on the selection as illustrated below.

Resetting Selected

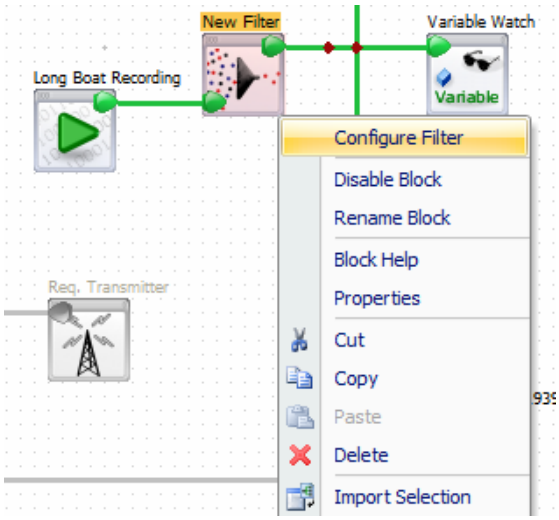

Packet Watch
Prot.
ID
Abbreviation
Description
Avg. Period
J1939 65226 DM01 Active Diagnostic Trouble Codes 1000.01 ms
J1939 61455 AT1OG1 Aftertreatment 1 Outlet Gas 1
J1939 64965 ECUID ECU Identification Information
J1939 61444 E ronic Engine Controller 1 20.03 ms
J1939 61443 E ronic Engine Controller 2
J1939 65253 H e Hours, Revolutions 2000.06 ms
J1939 61466 T e Throttle / Fuel Actuator Control Command
J1939 65266 L Economy (Liquid) 99.99 ms
Delete Selected
Define PGN 64965
Goto definition
Reset Selected
Reset All

Resetting All


Packet Watch
Prot.
ID
Abbreviation
Description
J1939 65226 DM01 Active Diagnostic Trouble Codes
J1939 61455 AT1OG1 Aftertreatment 1 Outlet Gas 1
J1939 64965 ECUID ECU Identification Information
J1939 61444 EEC1 Electronic Engine Controller 1
J1939 61443 EEC2 Electronic Engine Controller 2
J1939 65253 HOURS Engine Hours, Revolutions
J1939 61466 TFAC Engine Throttle / Fuel Actuator C
J1939 65266 LFE Fuel Economy (Liquid)
Delete Selected
Define PGN 64965
Goto definition
Reset Selected
Reset All

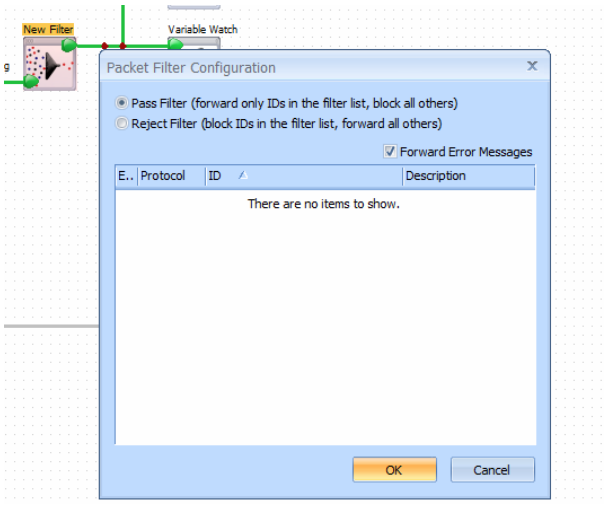
Packet Filter Function Block

You may place a **Packet Filter Functional Block** between a source device, such as a **ECOM** or **Recorder Block,** and a passive interface, such as the **Graphing Functional Block.** The **Packet Filter Block** may be either a **Pass Filter** or a **Reject Filter**. A **Packet Filter Functional Block** may be configured by right clicking on the **Packet Filter Functional Block** and selecting **[Configure Filter]** from the drop down menu by left clicking the mouse on the selection as illustrated below.



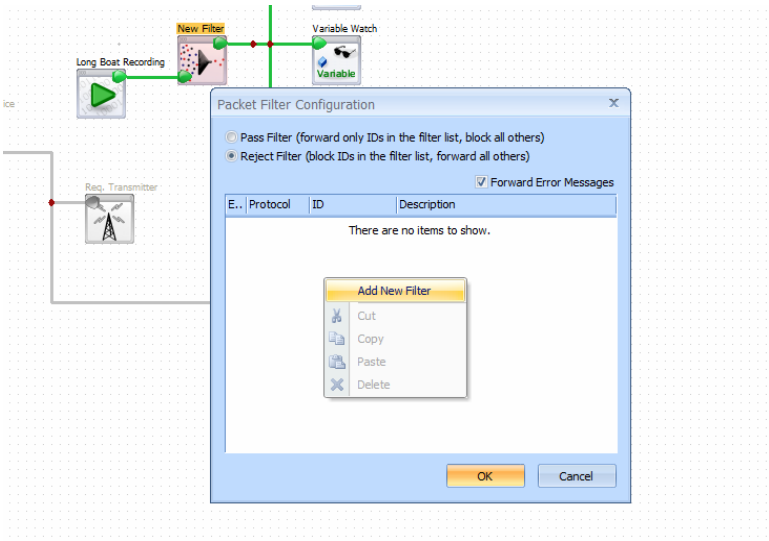
The **Packet Filter Configuration Window** will now open as illustrated below. From this menu you may select the type of filter you desire:

- **Pass Filter** (forward only IDs in the filter list and block all others
- **Reject Filter** (block IDs in the filter list and forward all others

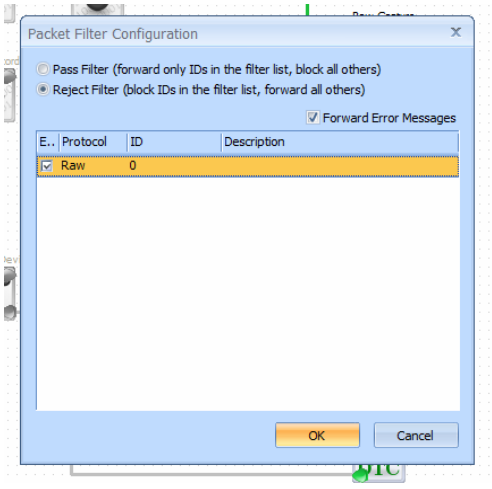


Adding a New Packet Filter

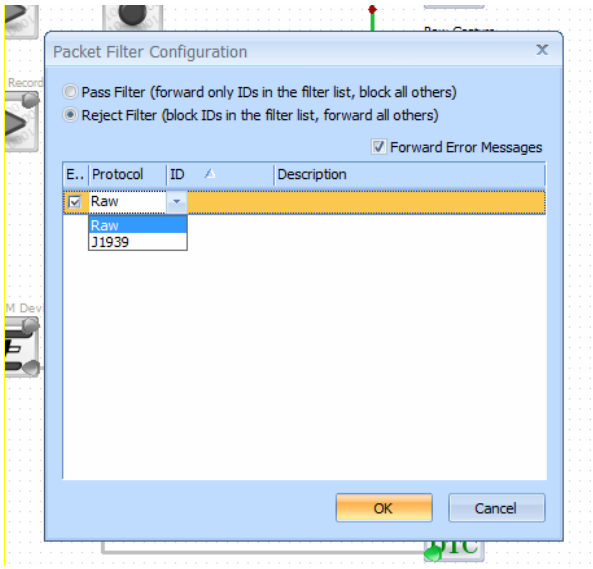
You may add a new filter to the **Packet Filter Window** by right clicking on the **Packet Filter Window** and selecting **[Add New Filter]** by left clicking the mouse on the selection as illustrated below**.**



The new filter will appear on the **Packet Filter Configuration Window** as illustrated below.

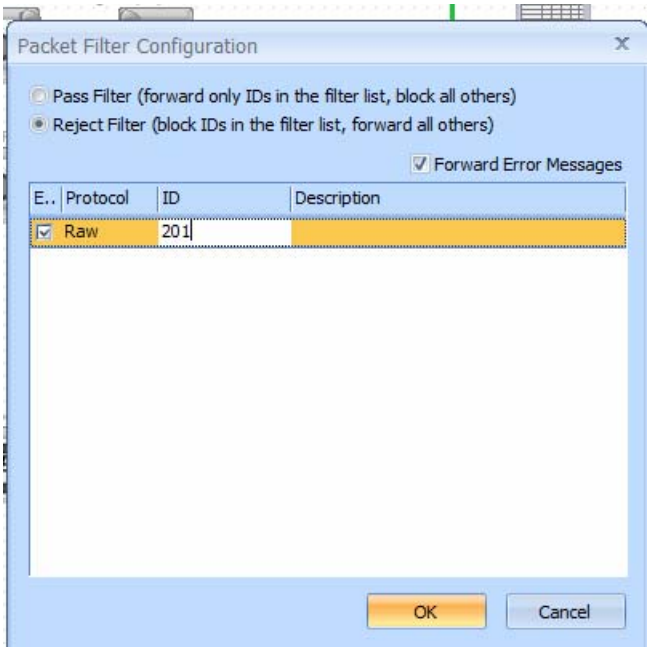


You may now select the message protocol from either **[RAW]** or **[J1939]** by double clicking the **Protocol Column** and selecting from the drop down menu as illustrated below.

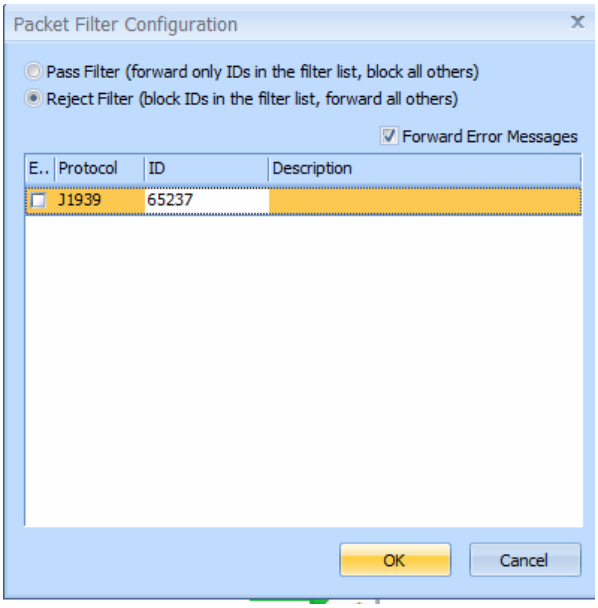


To enter the message **ID** that you want to filter double click under the **ID Column** and enter the message identifier as illustrated below.

For a Raw Protocol Message enter the RAW Identifier (11-bit or 29-bit)

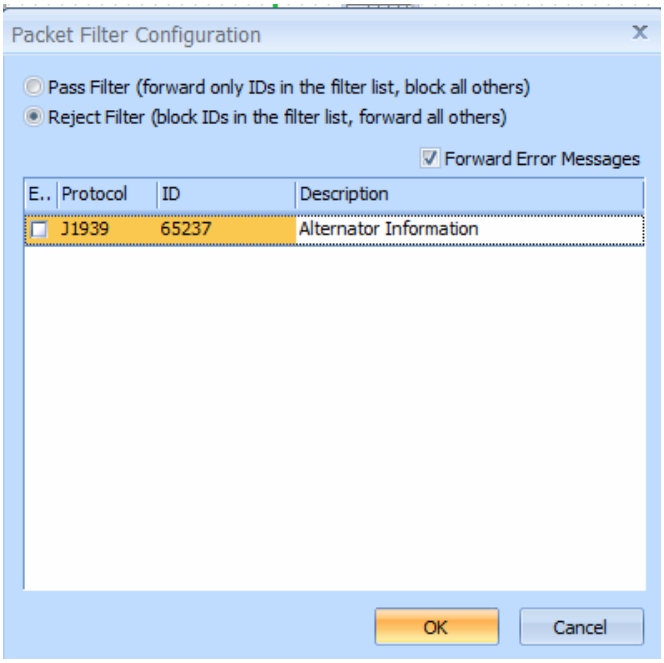


For a J1939 Protocol Message enter the PGN identifier



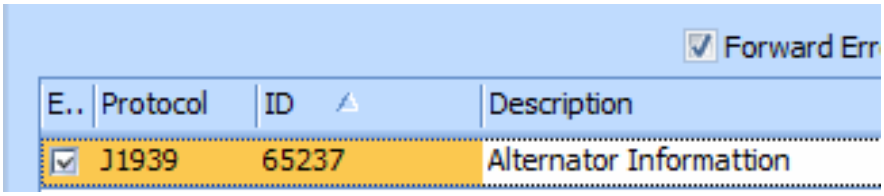
Entering a Message Description

You may enter a message **Description** by double clicking under the **Description Column** and entering a **Description** of your choice as illustrated below.



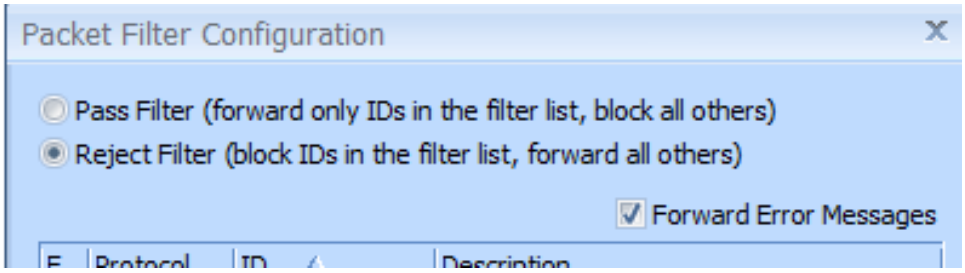
Enabling / Disabling a Packet Filter

You may enable or disable a **Packet Filter** by adding or removing the check mark **[√]** in the enable box under the **[E..]** (enable) column heading by left clicking the mouse when the mouse cursor is over the selection box as illustrated below.



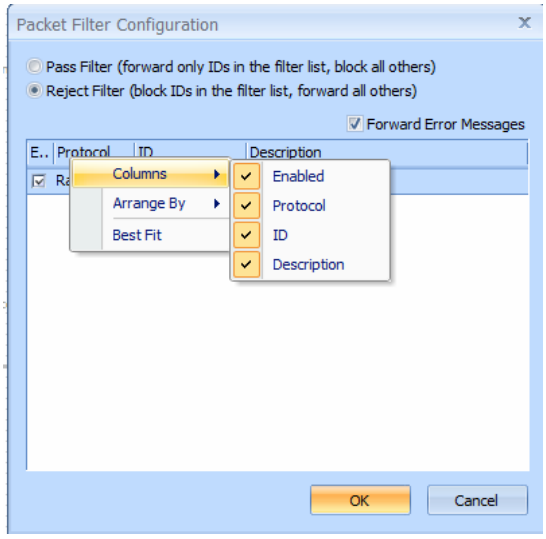
Forwarding Error Messages

You may forward all error messages independent of the **Packet Filter** settings by selecting **Forward Errors** selection box and adding a check mark **[√]** by left clicking the mouse with the cursor over the selection box. To disable **Error Message Forwarding** remove the check mark **[√]** from the selection box by left clicking the mouse with the mouse cursor over the selection box as illustrated below.


Packet Filter Configuration
Pass Filter (forward only IDs in the filter list, block all others)
Reject Filter (block IDs in the filter list, forward all others)
Forward Error Messages

Selecting the Packet Filter Message Columns to be Displayed

You may select the information columns that will be displayed on the **Packet Filter Configuration Window** by right clicking on the column headings and selecting **[Columns ▶]**as illustrated below. You may select information columns that you want to display by adding a check mark **[√]** by clicking the left mouse button while the cursor is over the selection box to the left of the **Column Heading** on the drop down menu. To remove a selection simply left click the selection box that you want to remove until the check mark **[√]** is not visible.

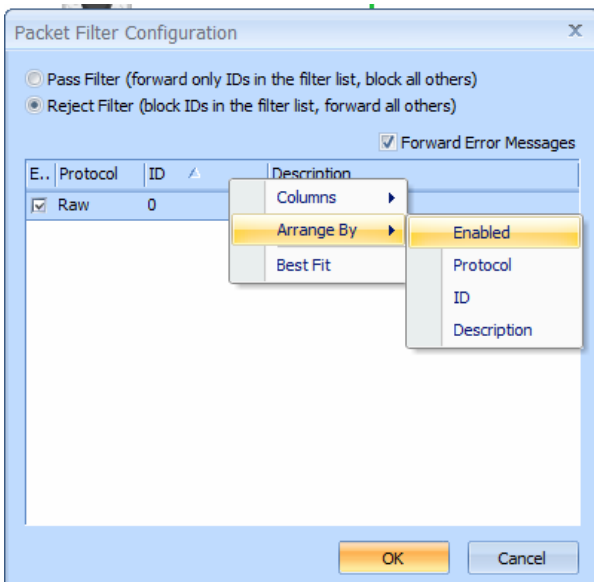


Selecting how the Packet Filter Display is Arranged

You may modify the order in which the packet filters are displayed on the **Packet Filter Configuration** screen by selecting **[Arrange by ►]** selection on the drop down menu as illustrated below or merely right clicking on the column heading.

The choices are:

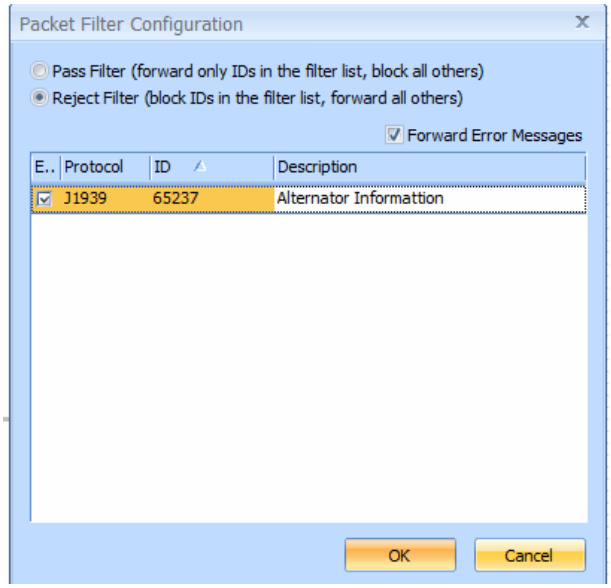
Enabled
Protocol
ID
Description



You may also choose to let **CANCapture** decide how to display the **Packet Filter Configuration** screen by selecting **[Best Fit ►]** on the selection screen.

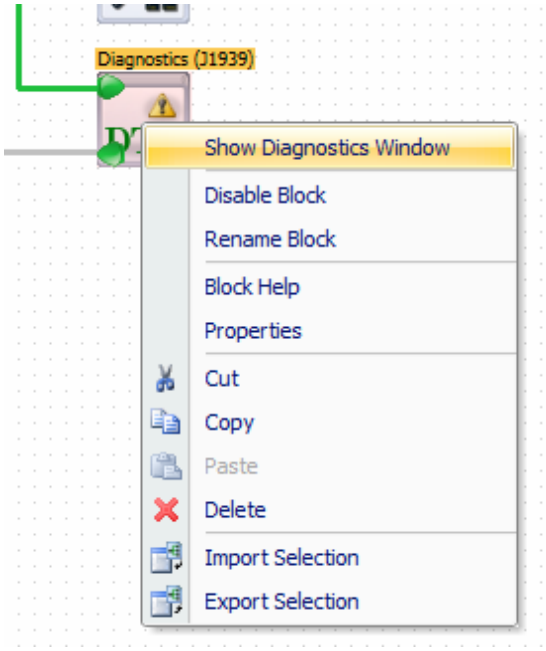
Completing the Packet Filter Configuration

When you are satisfied with the configuration of the **Packet Filters** click on the **[OK]** button to accept all changes and return to the main window. If you want to discard your changes right click on the **[Cancel]** button as illustrated below.

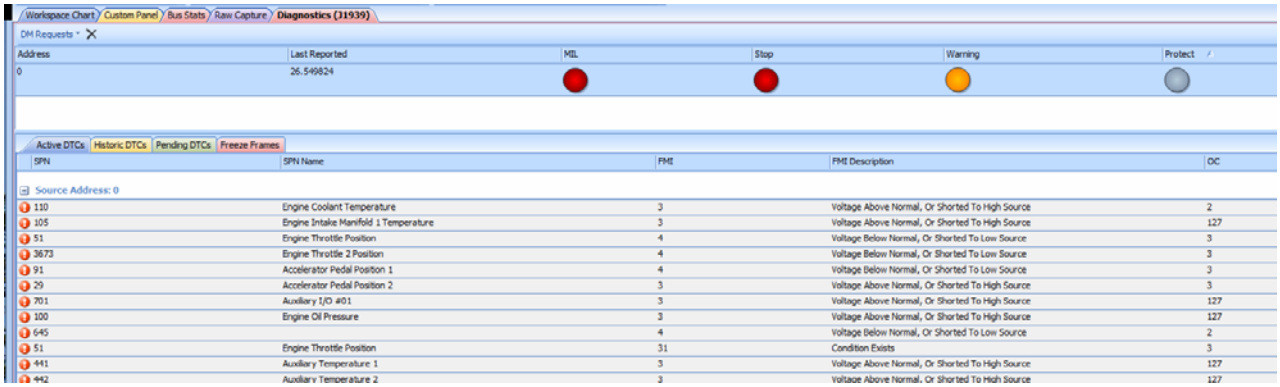


J1939 Diagnostics Function Block

You may display the **J1939 Diagnostics Functional Block** by right clicking the mouse button on the **J1939 Functional Block** and selecting **[Show Diagnostics Window]** by left clicking the mouse button on the selection as illustrated below or by simply double clicking the left mouse button on the **J1939 Diagnostics Functional Block.**



The following window will appear displaying the **J1939 Diagnostic** Information.

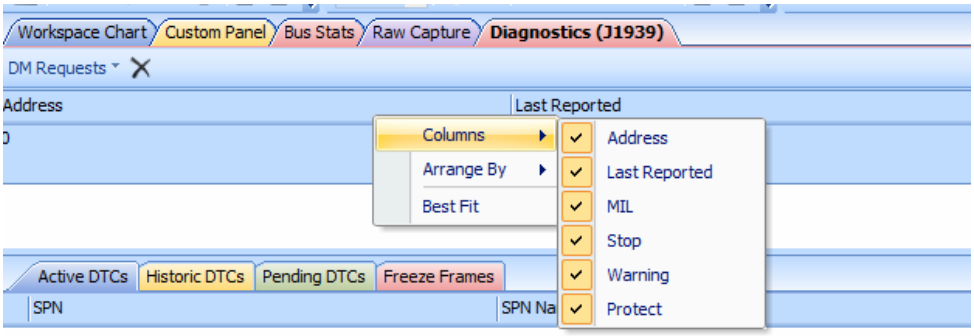

Workspace Chart
Custom Panel
Bus Stats
Raw Capture
Diagnostics (J1939)
DM Requests
Address
Last Reported
MIL
Stop
Warning
Protect
0
26.549824
Active DTCs
Historic DTCs
Pending DTCs
Freeze Frames
SPN
SPN Name
FMI
FMI Description
OC
Source Address: 0
110 Engine Coolant Temperature 3 Voltage Above Normal, Or Shorted To High Source 2
105 Engine Intake Manifold 1 Temperature 3 Voltage Above Normal, Or Shorted To High Source 127
51 Engine Throttle Position 4 Voltage Below Normal, Or Shorted To Low Source 3
3673 Engine Throttle 2 Position 4 Voltage Below Normal, Or Shorted To Low Source 3
91 Accelerator Pedal Position 1 4 Voltage Below Normal, Or Shorted To Low Source 3
29 Accelerator Pedal Position 2 3 Voltage Above Normal, Or Shorted To High Source 3
701 Auxiliary I/O #01 3 Voltage Above Normal, Or Shorted To High Source 127
100 Engine Oil Pressure 3 Voltage Above Normal, Or Shorted To High Source 127
645 4 Voltage Below Normal, Or Shorted To Low Source 2
51 Engine Throttle Position 31 Condition Exists 3
441 Auxiliary Temperature 1 3 Voltage Above Normal, Or Shorted To High Source 127
442 Auxiliary Temperature 2 3 Voltage Above Normal, Or Shorted To High Source 127

Selecting the Display Columns for the J1939 Diagnostic Window

You may select the information columns to be displayed on the **J1939 Diagnostic Display Window** by right clicking on the column headings and selecting from the drop down menu as illustrated below.

The choices are:

Address
Last Reported
MIL
Stop
Warning
Protect



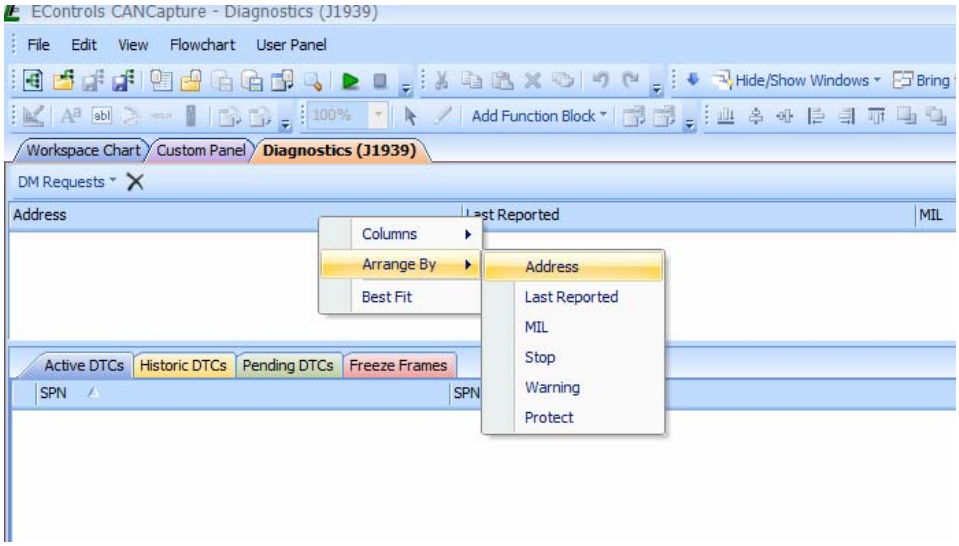
To select the columns that you want to display add a check mark **[√]** in the selection box preceding the selection by left clicking the mouse with the cursor over the selection box. To remove an information column from the display remove the check mark **[√]** from the selection box by left clicking the mouse with the cursor over the selection box.

Changing the Arrangement the Display on the J1939 Diagnostic Window

You may change the arrangement of the indicators on the **J1939 Diagnostic Display Window** by right clicking the mouse button on the column headings and selecting **[Arrange By ►]** from the drop down menu as illustrated below.

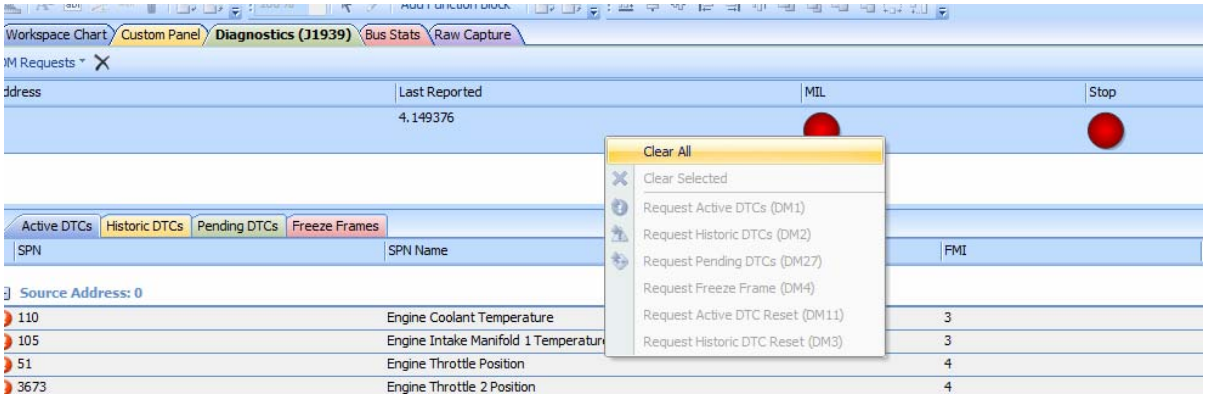
The choices are:

- Address
- Last Reported
- MIL
- Stop
- Warning
- Protect



Clearing the J1939 Diagnostic Indicators

You may clear all **J1939 Diagnostics** indicators by right clicking the mouse on the indicator window and left clicking the mouse and selecting **[Clear All]** as illustrated below.

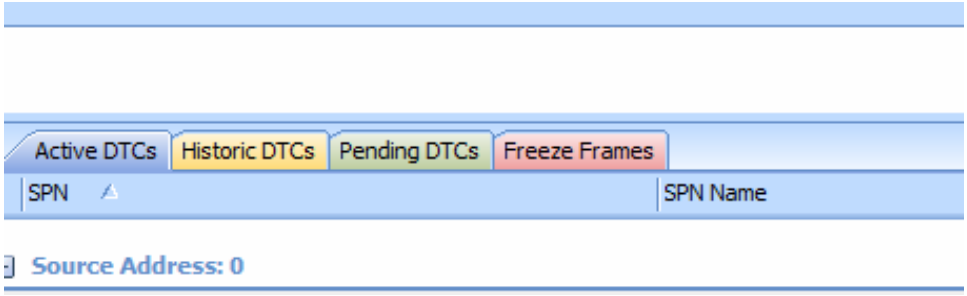


J1939 Diagnostic Display Tabs

There are four tabs on the **J1939 Diagnostics Display Window** as illustrated below.

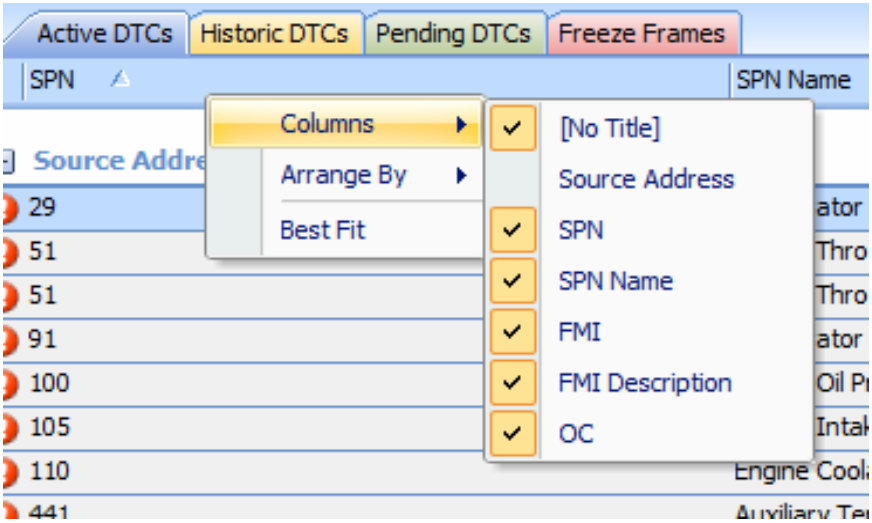
These are:

- Active DTCs
- Historic DTCs
- Pending DTCs
- Freeze Frames



Selecting Columns to Display on the J1939 Diagnostic Window

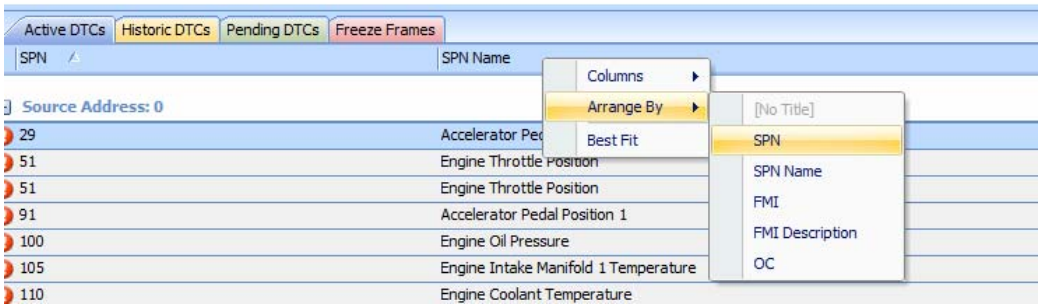
You may select the columns you want to display by right clicking on the column headings and selecting **[Columns ▶]** by left clicking the mouse on the selection as illustrated below.



You may now select the **[Column ▶]** to display by adding a check mark **[√]** to the selection box preceding the **Column Definition** by left clicking the mouse with the mouse cursor on the selection box. To remove a column from the display you need to remove the check mark **[√]** from the selection box by left clicking the mouse with the cursor on the selection box.

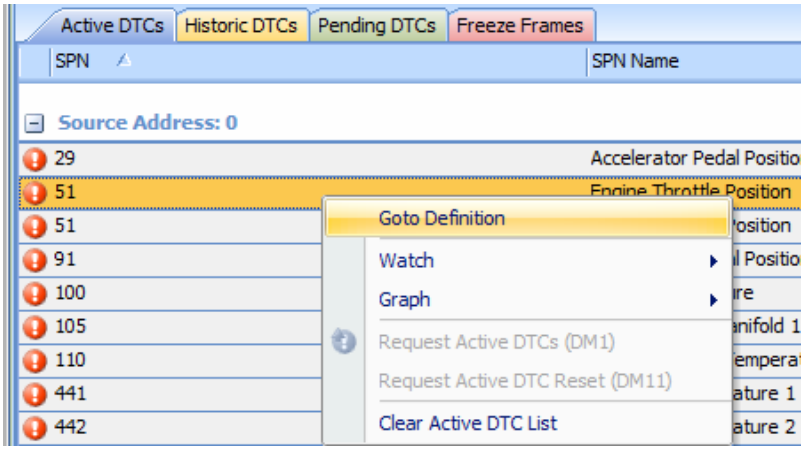
Selecting the Column Arrangement on the J1939 Diagnostic Window

You may arrange the **Columns** on the **J1939 Diagnostic Display Window** by right clicking on the **Column Headings** and Selecting [**Arrange By ►**] from the drop down menu as illustrated below or by merely left clicking on the column heading.



Options on the J1939 Diagnostic Window

You may select the options for the various **Diagnostic Trouble Codes** by right on the **DTC** and selecting from the drop down by left clicking the mouse on the selection menu as illustrated below.

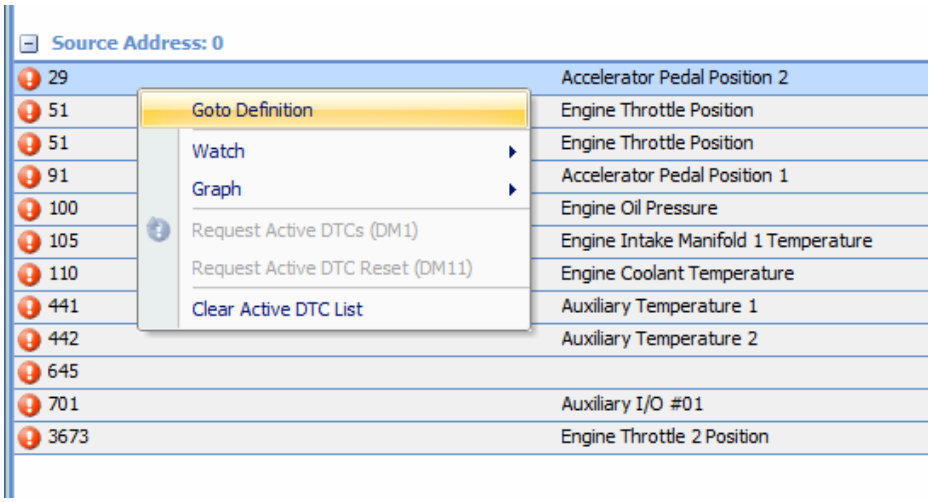


The options are:

- Goto Definition
- Watch
- Clear Active DTC list

DTC Options

You may employ the various options on an individual **DTC** by right clicking the mouse on the specific **DTC** and selecting the option you desire from the drop down menu by left clicking on the selection as illustrated below.

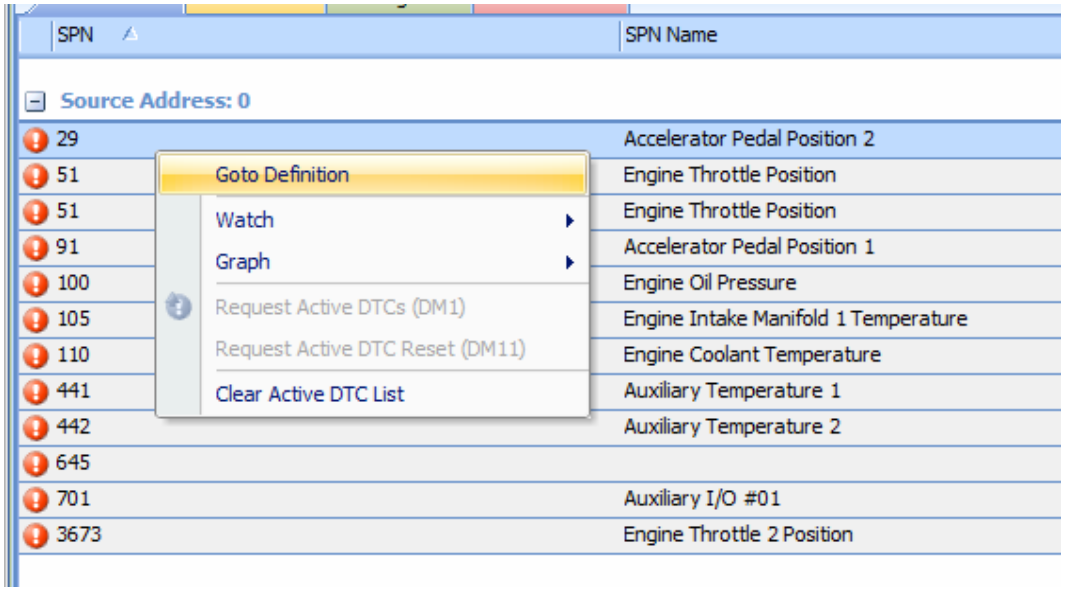


The choices are:

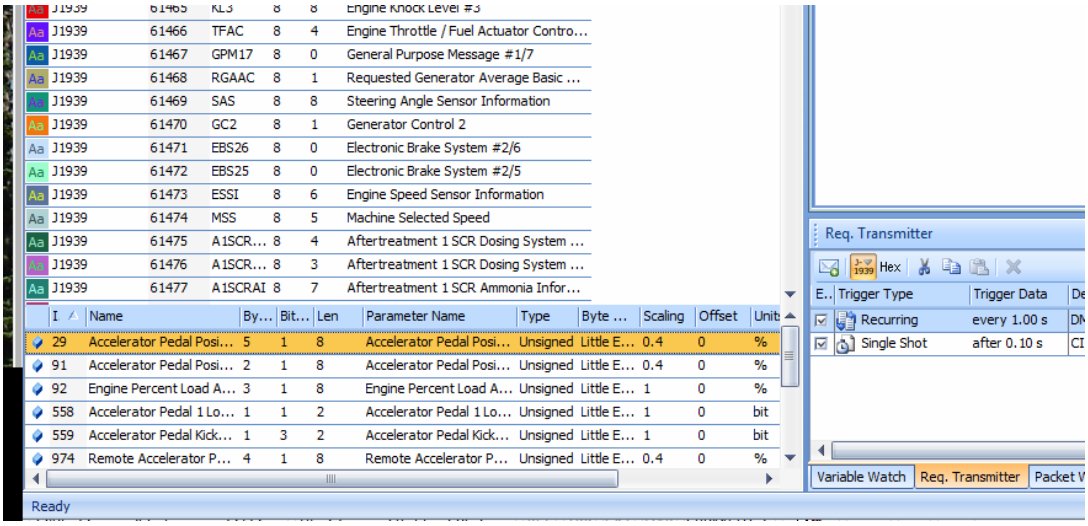
- Goto Definition
- Watch
- Graph
- Request Active DTCs (DM1)
- Request Active DTC Request (DM11)
- Clear Active DTC List

Selecting Goto Definition on the DTC Options Menu

You may select the **Goto Definition** option on the drop down menu by left clicking the mouse on the **[Goto Definition]** Selection as illustrated below.

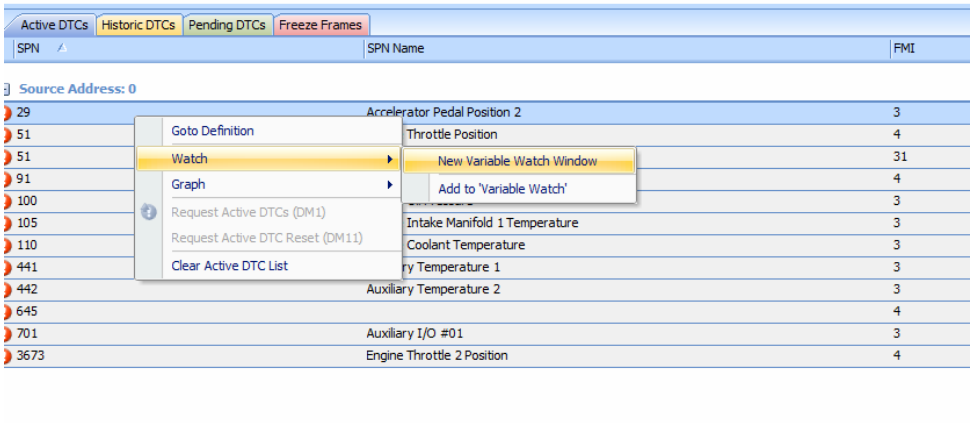


The **CAN Database Window** will now open showing the definition for the **DTC** that is highlighted.

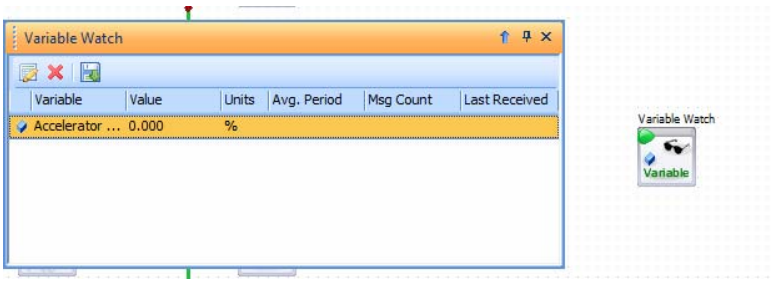

J1939 61466 TFAC 8 4 Engine Throttle / Fuel Actuator Contro...
J1939 61467 GPM17 8 0 General Purpose Message #1/7
J1939 61468 RGAAC 8 1 Requested Generator Average Basic ...
J1939 61469 SAS 8 8 Steering Angle Sensor Information
J1939 61470 GC2 8 1 Generator Control 2
J1939 61471 EBS26 8 0 Electronic Brake System #2/6
J1939 61472 EBS25 8 0 Electronic Brake System #2/5
J1939 61473 ESSI 8 6 Engine Speed Sensor Information
J1939 61474 MSS 8 5 Machine Selected Speed
J1939 61475 A1SCR... 8 4 Aftertreatment 1 SCR Dosing System ...
J1939 61476 A1SCR... 8 3 Aftertreatment 1 SCR Dosing System ...
J1939 61477 A1SCRAI 8 7 Aftertreatment 1 SCR Ammonia Infor...
I Name By... Bit... Len Parameter Name Type Byte ... Scaling Offset Unit
29 Accelerator Pedal Posi... 5 1 8 Accelerator Pedal Posi... Unsigned Little E... 0.4 0 %
91 Accelerator Pedal Posi... 2 1 8 Accelerator Pedal Posi... Unsigned Little E... 0.4 0 %
92 Engine Percent Load A... 3 1 8 Engine Percent Load A... Unsigned Little E... 1 0 %
558 Accelerator Pedal 1 Lo... 1 1 2 Accelerator Pedal 1 Lo... Unsigned Little E... 1 0 bit
559 Accelerator Pedal Kick... 1 3 2 Accelerator Pedal Kick... Unsigned Little E... 1 0 bit
974 Remote Accelerator P... 4 1 8 Remote Accelerator P... Unsigned Little E... 0.4 0 %
Req. Transmitter
Hex
E.. Trigger Type Trigger Data
Recurring every 1.00 s
Single Shot after 0.10 s
Variable Watch
Req. Transmitter
Ready

Adding a New Variable Watch Window for the DTC

You may **Add** a new **Variable Watch Window** for a **DTC** by right clicking on the specific **DTC** you wish to affect and select **[Watch ►]** and then **[New Variable Watch Window]** by left clicking the mouse on the selection as illustrated below.



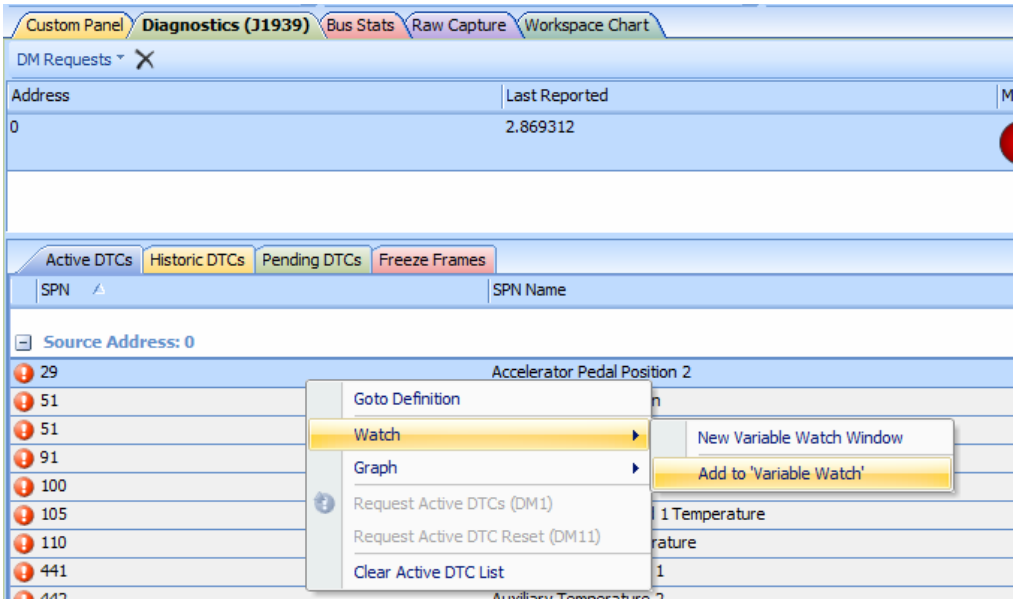
The following window will open showing the new **Variable Watch Window** and a new **Variable Watch Functional Block** will appear on the **Graphical Workspace Flowchart**.



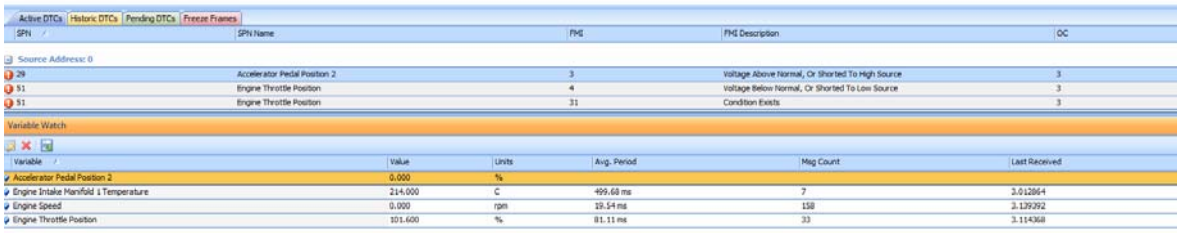
To configure the **DTC** in the **Variable Watch Window** follow the instructions for the **Variable Watch Window** described earlier in this manual. You will need to connect the new **Variable Watch Functional Block** to your system as desired on the **Graphical Workspace Flowchart** using the **Line Connector** described earlier in this document.

Adding a DTC to a Variable Watch Window

You may add a **DTC** to a **Variable Watch Window** by right clicking on the specific **DTC** and selecting **[Watch ►]** and then **[Add to 'Specific Name']** from the drop down menu by left clicking the mouse on the selection as illustrated below.

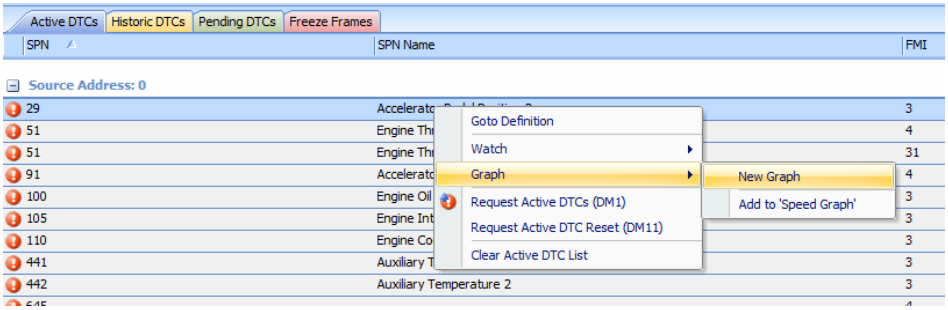


The **DTC** will be added to the **Variable Watch Window** as illustrated below.

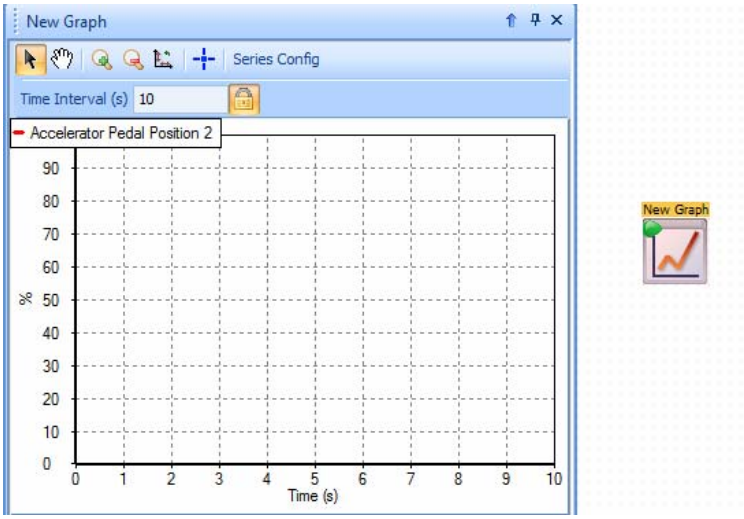


Adding the DTC(s) to a Graph Window

You may add a **DTC** or **DTCs** to a **New Graph** window by right clicking on the specific **DTC** and selecting **[Graph ►]** and then **[New Graph]** from the drop down menu by left clicking the mouse on the selection as illustrated below.



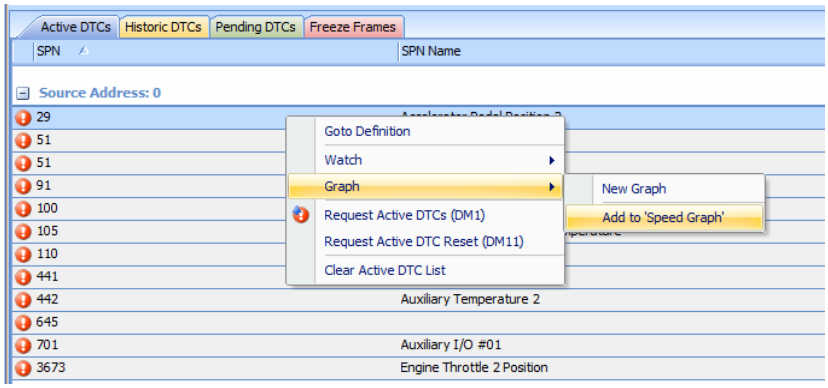
A **New Graph Window** and a **Graph Functional Block** will appear on the **Graphical Workspace Flowchart** as illustrated below.



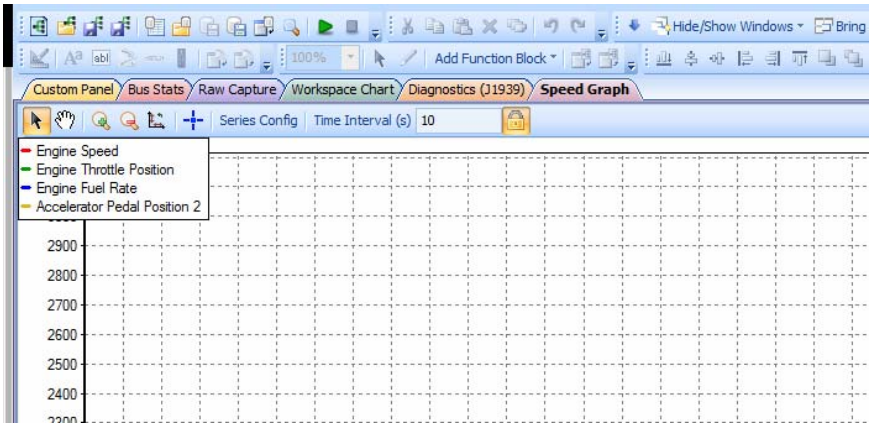
You may now configure the **New Graph** by referring to the **Graph Window Configuration** setting section earlier in this manual. In addition you will need to connect the new **Graph Functional Block** to the system using the **Drawing Pen** as described earlier in this document.

Adding a DTC(s) to an existing Graph Window

You may add a **DTC** or **DTCs** to an existing **Graph Window** by right clicking on the specific **DTC** and selecting **[Graph ▶]** and **[Add to '(*specific name*)' Graph]** from the drop down menu by left clicking on the **[Add to '(*specific name*) Graph']** as illustrated below.



The existing **Graph Window** will now open showing the addition of your specific **DTC(s) included to the graph.**

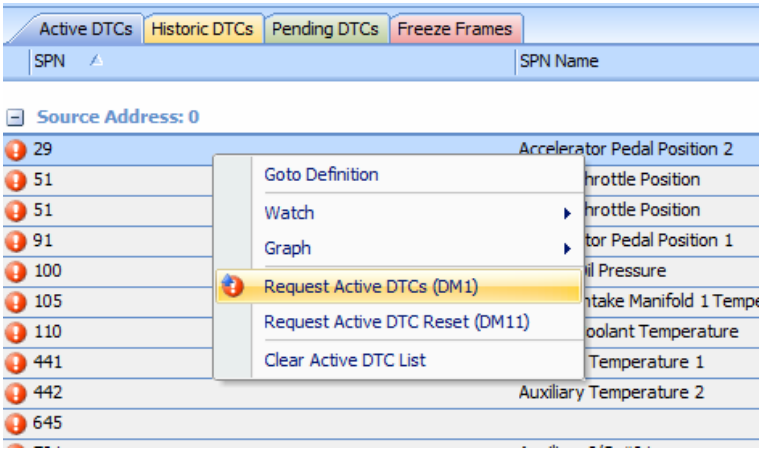


You may now configure the **Graph** to your needs by referring to **Configuring the Graph Window** section earlier in this document.

Requesting Active DTCs

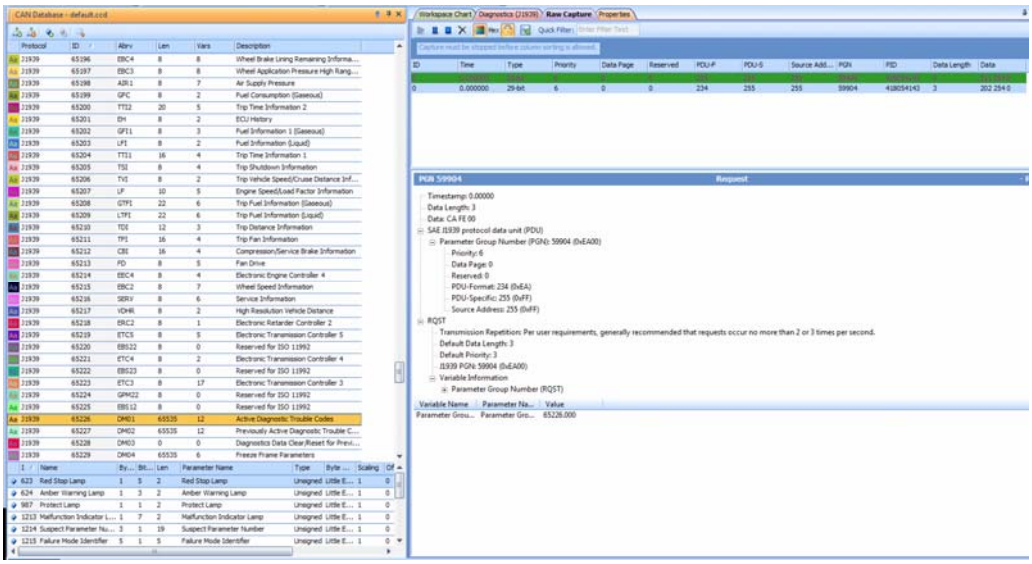
You may request Active **DTCs** by selecting right clicking on the **DTC** list and selecting **[Request Active DTCs (DM1)]** from the drop down menu by left clicking the mouse on the selection as illustrated below.

Note: 1.CANCapture must be running in order for these options to be available
2. This is only necessary if the ECU is not already broadcasting the Active DTCs.



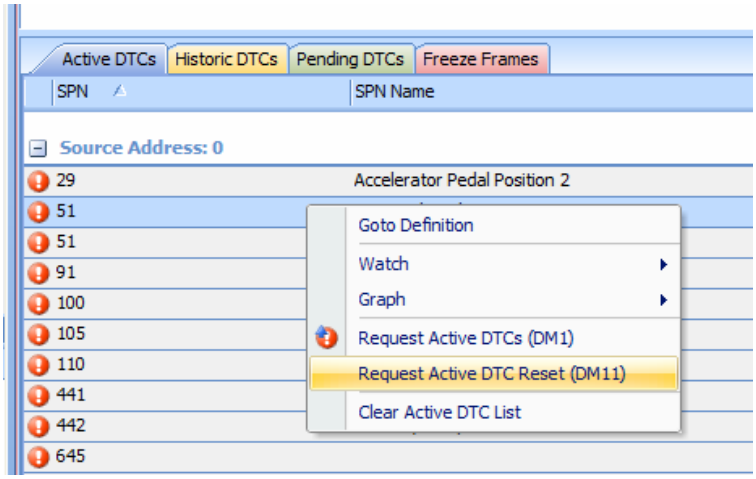
This will send a request out of the output port on the **J1939 Diagnostic Functional Block** to the CAN bus. **Note:** The output port must be connected for this to operate properly.

The following Message will be sent out **65226 Active Diagnostic Trouble Codes** per the J1939 protocol



Requesting an Active DTC Reset (DM11)

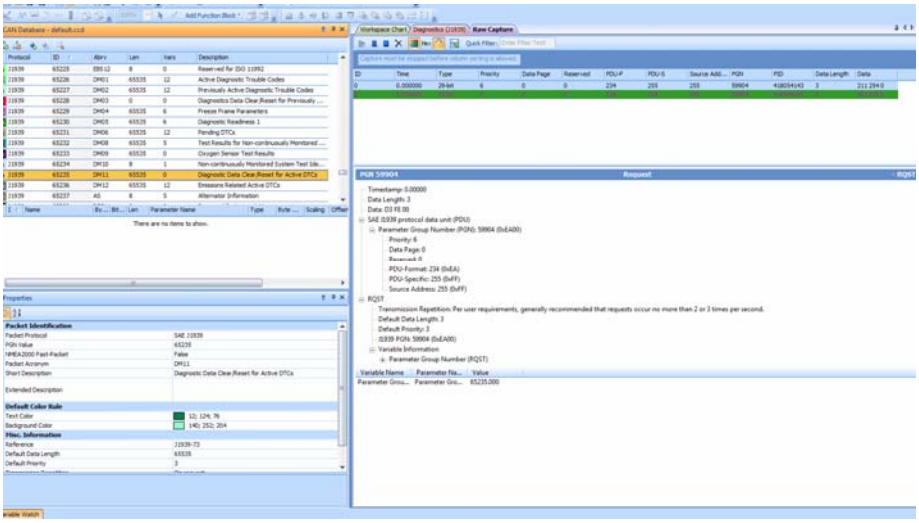
You may request an **Active DTC Reset (DM11)** by right clicking on the **DTC** list and selecting **[Request Active DTC Reset (DM11)]** by left clicking the mouse on the selection as illustrated below.



This will send the request out of the output port of the **J1939 Diagnostic Functional Block**.

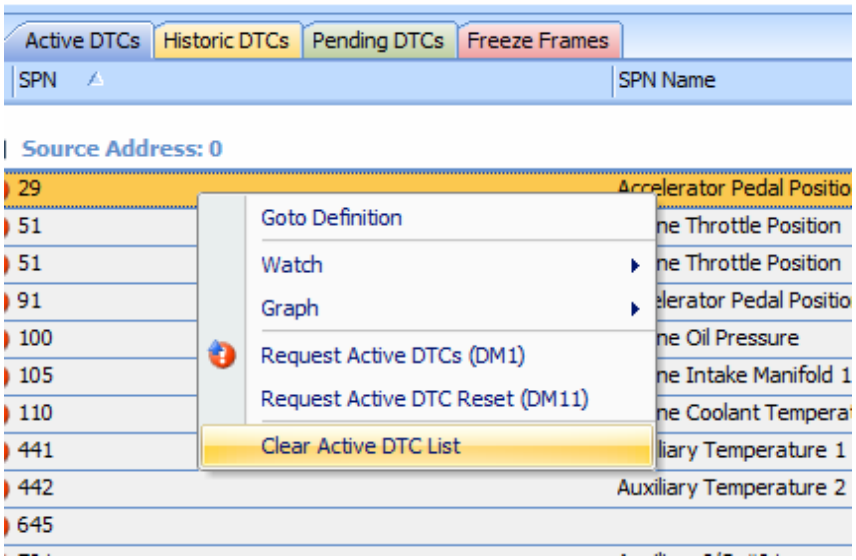
Note: You must have the output port of the **J1939 Diagnostic Functional Block** connected to the system.

The following will be sent out **65235 Diagnostic Data Clear Reset for Active DTCs** per the J1939 protocol



Clearing the Active DTC List

You may **Clear the Active DTC List** by right clicking on any of the **DTCs** on the list and select **[Clear Active DTC List]** from the drop down menu by left clicking the mouse on the **[Clear Active DTC List]** selection as illustrated below.

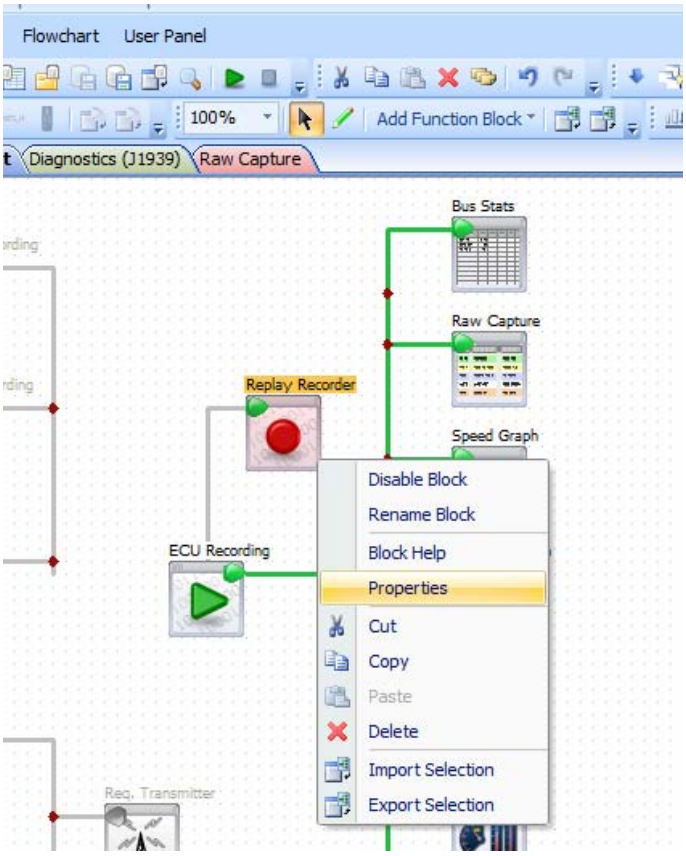


All active **DTCs** will now be cleared from the list.

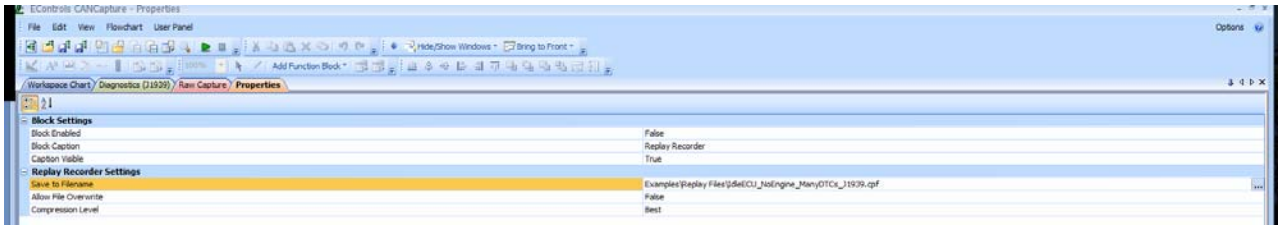
Note: This does not send a CAN message to clear or reset DTCs. It simply clears the items from the list.

Replay Recorder Function Block

You may set up the replay recorder by either right clicking on the mouse on the **Replay Recorder Functional Block** and selecting **[Properties]** in the drop down menu by left clicking on the selection as illustrated below or simply double clicking the left mouse button on the **Replay Recorder Functional Block.**

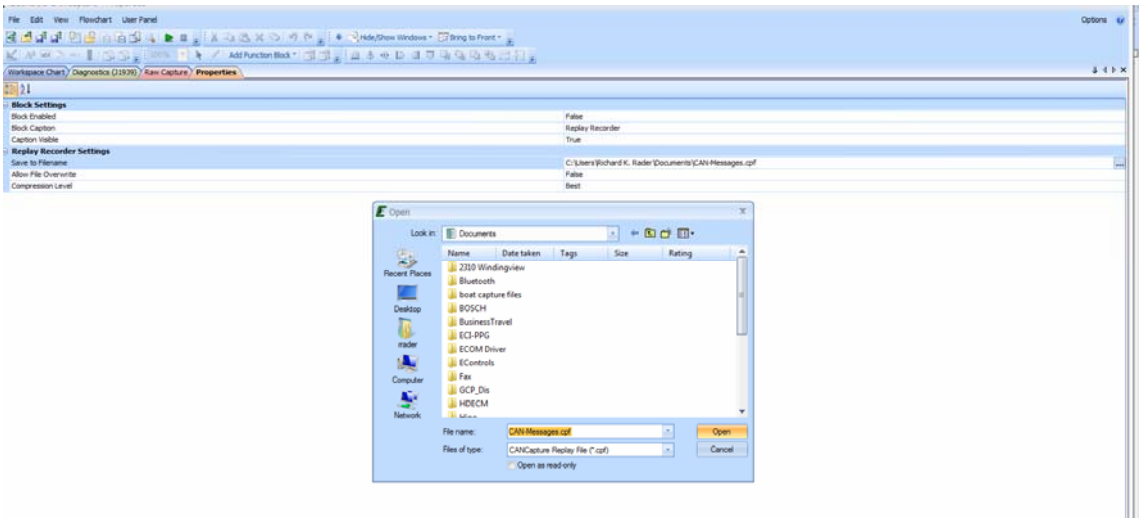


The Properties window will now open displaying all the settings for the recorder block..



Saving Can Message Data

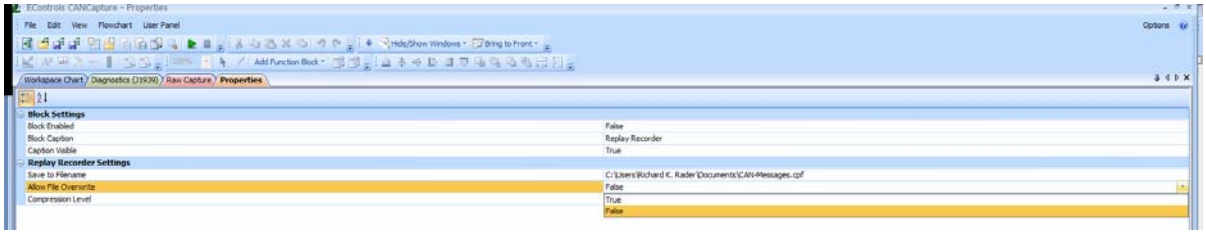
You may now select the file you wish to save the CAN message data to by selecting the **[…]** icon at the far right-hand side of the **Save to Filename** setting as illustrated below.



You may now select the file you wish to save your data to from the widow illustrated above. The file will be stored in the *.cpf (Can Playback File) format.

Selecting the file Overwrite option

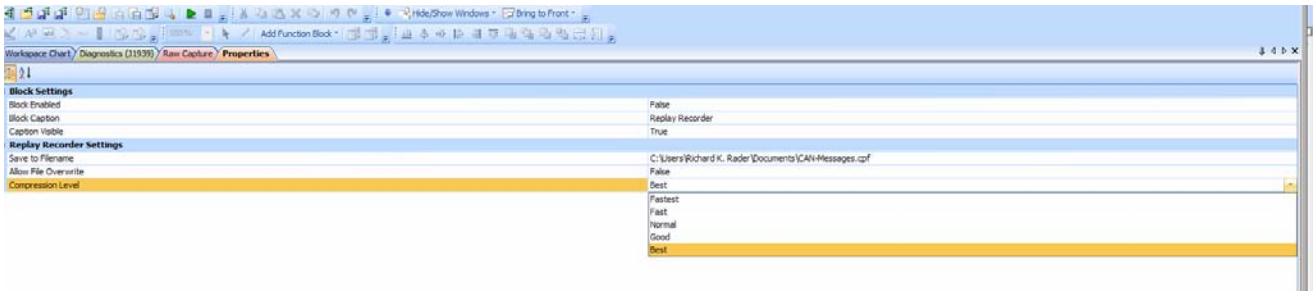
You may select the **Allow File Overwrite option** by left clicking the mouse on the [▼] icon on the far right hand side of the **Allow File Overwrite option** selection as illustrated below.



You may now select either **True** or **False** from the drop down menu by right clicking on the selection. If you select **False** the data file will be protested from being overwritten at a later date. If you select **True** the file may be overwritten and you will lose all previously recorded data every time a new capture is started.

Setting the Level of Compression of the Data File

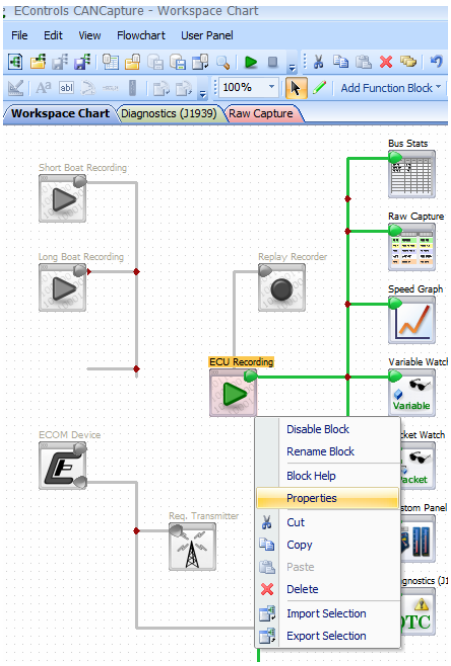
You may set the level of compression of the data of your file by right clicking the mouse on the [▼] on the far right-hand side of the **Compression Level** selection as illustrated below.



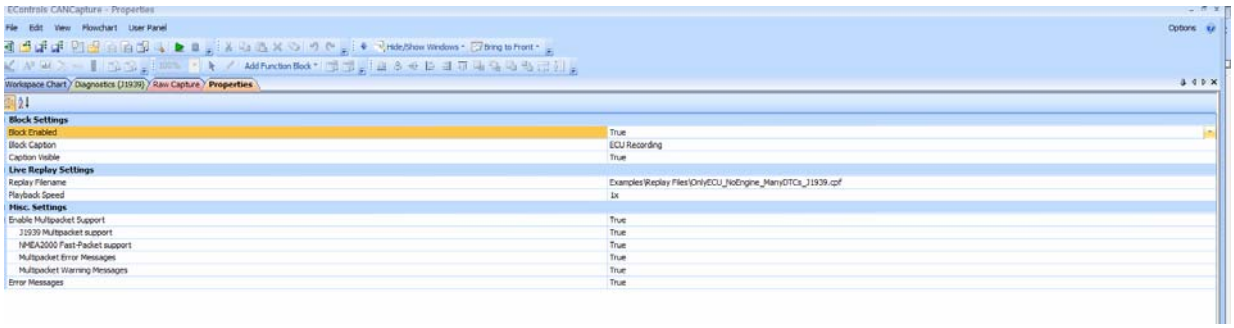
You may now select the amount of data compression you want from the drop down menu by left clicking your selection with the mouse. The **Fastest** selection will provide the best performance but the least amount of compression while the **Best** selection will provide the highest amount of compression. All other selections are somewhere in between these settings.

Live Replay Function Block

You may configure the parameters of the file replay block by right clicking the mouse button on the **Replay Functional Block** and selecting **[Properties]** from the drop down menu by left clicking on the **[Properties]** selection as illustrated below or simply double clicking on the **Replay Function Block**.

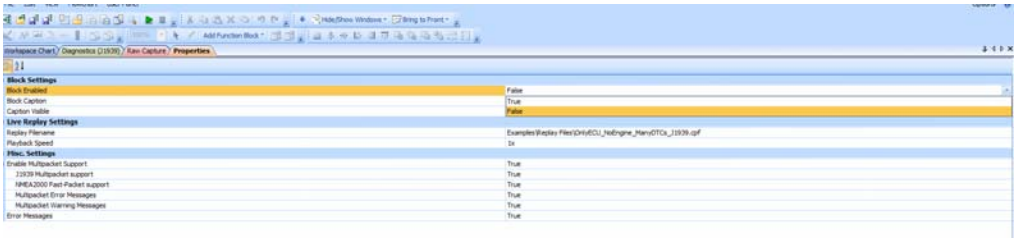


The following window will now open.



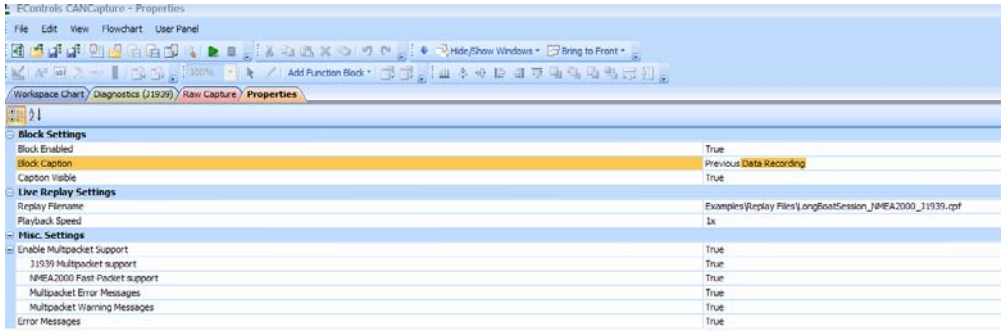
Enabling / Disabling the Live Replay Function Block

You may Enable or Disable the **Live Replay Functional Block** from this window by selecting the **Block Enabled** line and left clicking on the [▼] icon on the far right-hand side of the line and selecting either **True** or **False** from the drop down menu as illustrated below.



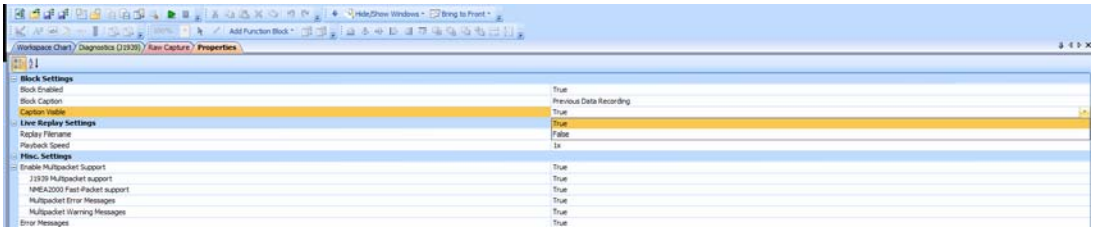
Modifying the Replay Block Caption

You may modify the **Live Replay Function Block Caption** by selecting **Block Caption** and holding down the right-hand mouse button while scrolling on the and highlighted the portion of the caption or the entire caption that you wish to modify and entering the caption that you desire to display on the flowchart as illustrated below.



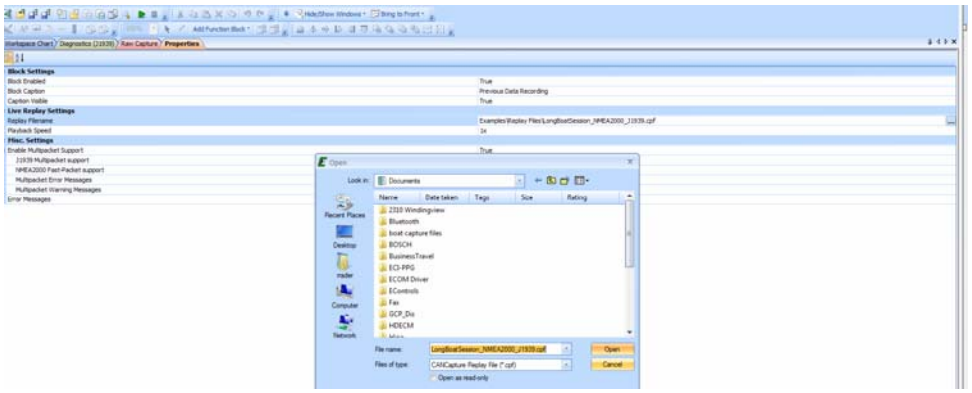
Selecting if the Caption is Visible

You may select if the **Caption** is **Visible** or not by selecting the **Caption Visible** option under **Block Settings** and left clicking on the [▼] icon at the far right-hand side of the **Caption Visible** line and selecting either **True** to make the Caption visible or **False** to make the caption invisible on the flowchart from the drop down menu as illustrated below.



Selecting the Data File to Playback

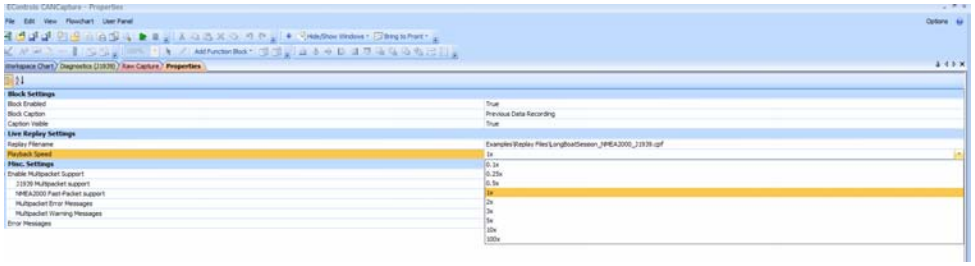
To select the data file that you have previously recorded for playback select the **[…]** icon on the far right-hand side of the **Replay Filename** line under **Replay Settings** by left clicking with the mouse as illustrated below.



You may then browse your computer storage for the file that you wish to replay and select open by right clicking the mouse on the **[Open]** icon.

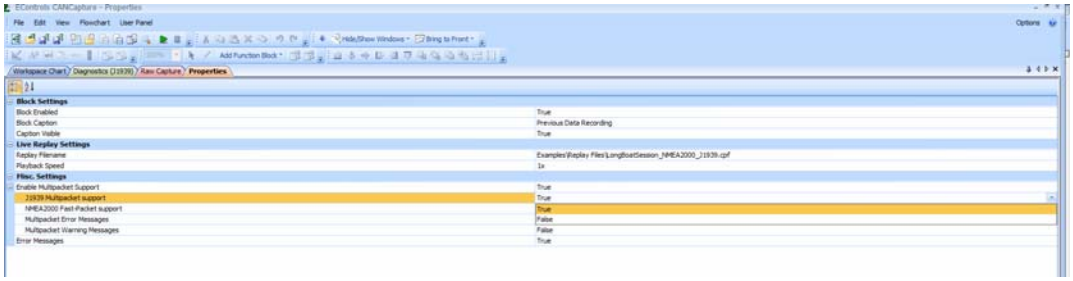
Setting the Playback Speed

You may select the desired playback speed of your data by selecting **Playback Speed** under **Live Replay Settings** and left clicking on the [▼] on the far right-hand side of the window and selecting the desired **Playback Speed** from the drop down menu as illustrated below or by double clicking on the **Playback Speed** to cycle through the various choices.



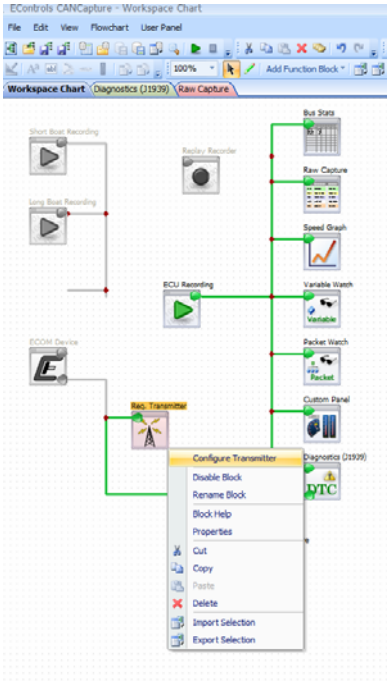
Miscellaneous Settings for the Playback Block

You may choose which **Miscellaneous Setting** you wish enabled or disabled by selecting the [▼] icon at the far right-hand side of the selection and selecting either **True** or **False** from the drop down menu by left clicking the mouse on the selection as illustrated below this will toggle the selection between **True** and **False** each time you double click. You may also double click the option to toggle between **True** and **False**.

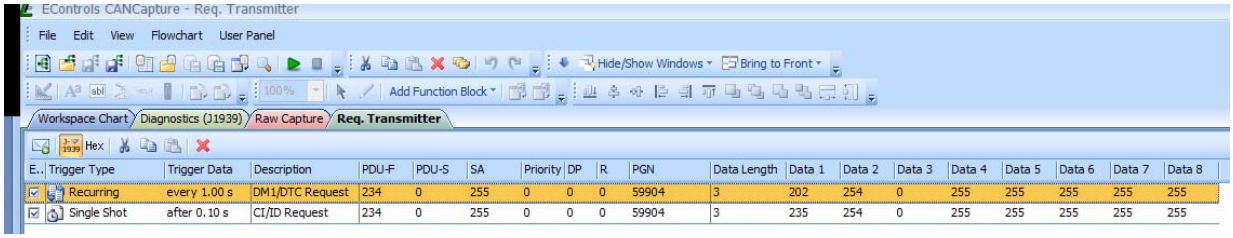


11-bit and 29-bit Message Transmitter Function Blocks

You may configure the various parameters of the **Message Transmitter Functional Blocks** by right clicking the mouse on the function block and selecting **[Configure Transmitter]** from the drop down menu as illustrated below or by simply double clicking on the **Message Transmitter Functional Block**.



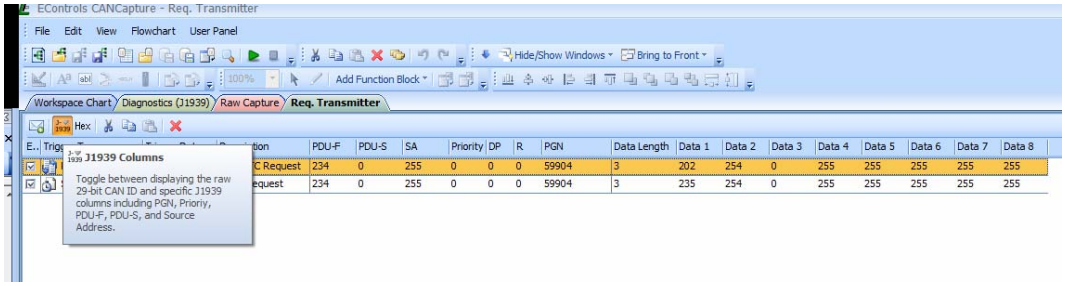
The following window will open displaying the configuration parameters of the **Message Transmitter Functional Block.**



E..	Trigger Type	Trigger Data	Description	PDU-F	PDU-S	SA	Priority	DP	R	PGN	Data Length	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8
☑	Recurring	every 1.00 s	DM1/DTC Request	234	0	255	0	0	0	59904	3	202	254	0	255	255	255	255	255
☑	Single Shot	after 0.10 s	CI/ID Request	234	0	255	0	0	0	59904	3	235	254	0	255	255	255	255	255

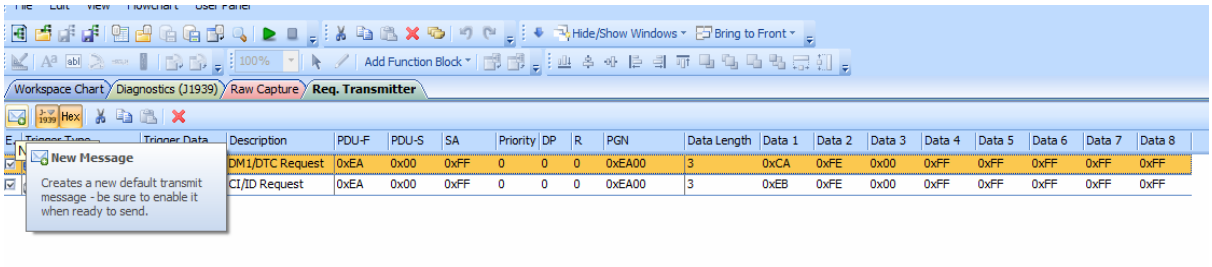
Selecting the CAN Data Column Display Format (29-bit Only)

You may toggle the display format for your CAN data in the columns by left clicking the mouse on the **J1939 Columns** selection on the toolbar of the **Message Transmitter** window as illustrated below. The data display format will toggle between **J1939** and **Raw 29-bit identifier** each time you click on the selection.


EControls CANCapture - Req. Transmitter
File Edit View Flowchart User Panel
Hide/Show Windows
Bring to Front
Add Function Block
Workspace Chart
Diagnostics (J1939)
Raw Capture
Req. Transmitter
Hex
J1939 Columns
Toggle between displaying the raw 29-bit CAN ID and specific J1939 columns including PGN, Priority, PDU-F, PDU-S, and Source Address.
PDU-F PDU-S SA Priority DP R PGN Data Length Data 1 Data 2 Data 3 Data 4 Data 5 Data 6 Data 7 Data 8
C Request 234 0 255 0 0 0 59904 3 202 254 0 255 255 255 255 255
equest 234 0 255 0 0 0 59904 3 235 254 0 255 255 255 255 255

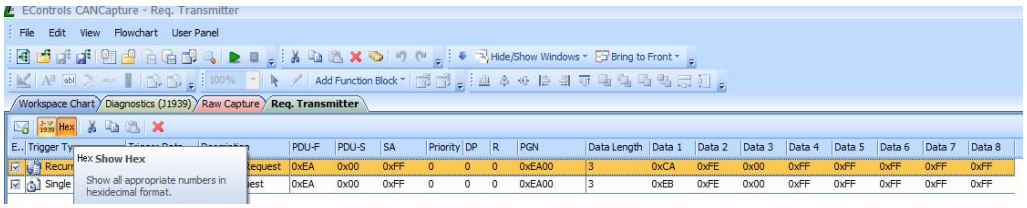
Adding a New Transmit Message

You may add a **New Transmit Message** by left clicking the mouse on the **envelope** icon in the **Transmitter** window toolbar as illustrated below.


Hide/Show Windows
Bring to Front
Add Function Block
Workspace Chart
Diagnostics (J1939)
Raw Capture
Req. Transmitter
Hex
New Message
Creates a new default transmit message - be sure to enable it when ready to send.
Description PDU-F PDU-S SA Priority DP R PGN Data Length Data 1 Data 2 Data 3 Data 4 Data 5 Data 6 Data 7 Data 8
DM1/DTC Request 0xEA 0x00 0xFF 0 0 0 0xEA00 3 0xCA 0xFE 0x00 0xFF 0xFF 0xFF 0xFF 0xFF
CI/ID Request 0xEA 0x00 0xFF 0 0 0 0xEA00 3 0xEB 0xFE 0x00 0xFF 0xFF 0xFF 0xFF 0xFF

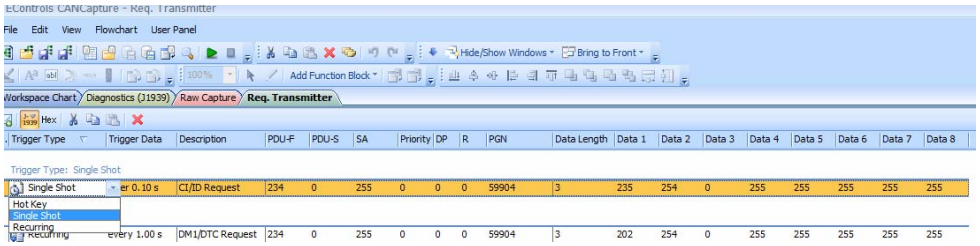
Displaying the Data in Hexadecimal

You may display the CAN Data in **Hexadecimal** by left clicking the mouse on the **[Hex]** selection in the **Message Transmitter** window toolbar as illustrated below. The display will toggle between **decimal** and **hexadecimal** each time you left click the mouse on the selection.



Setting the Trigger Type

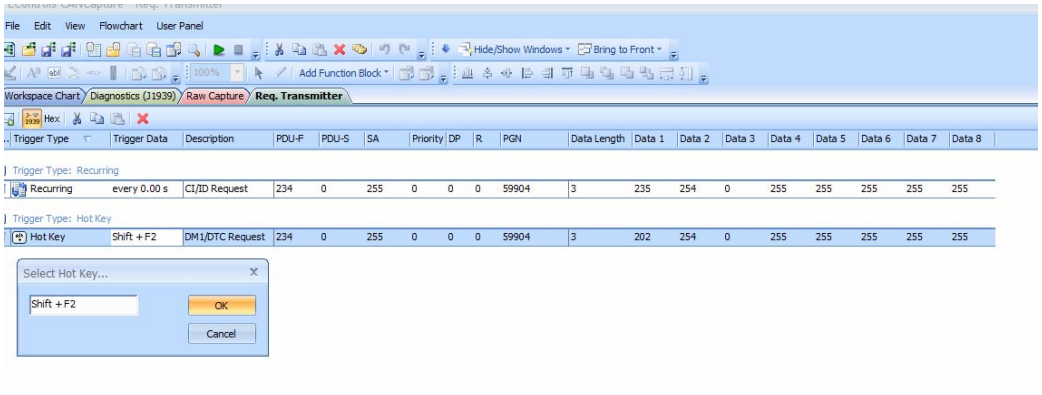
You may set the type of trigger for your request transmitter by double clicking on the trigger type window and then left clicking on the [▼] icon to and selecting the trigger type from the drop down menu as illustrated below.



The choices are Hot Key, Single Shot, or Recurring.

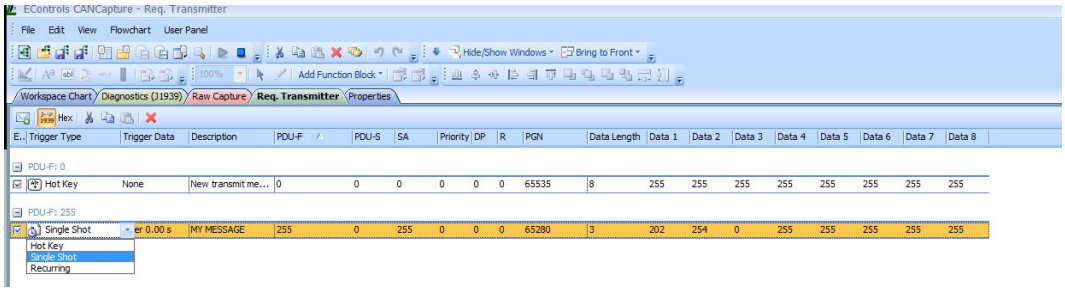
Selecting the Hot Key for Triggering the Message Transmitter

To select the specific **Hot Key** for triggering the **Message Transmitter** double click on the **Hot Key** option. When the **Select Hot Key…** window opens depress the specific keyboard key(s) you wish to be the **Hot Key**(s) as illustrated below. When you are satisfied with your selection left click on the **[OK]** button. If you want to discard your changes and return to the Message **Transmitter** configuration window left click on the **[Cancel]** button.



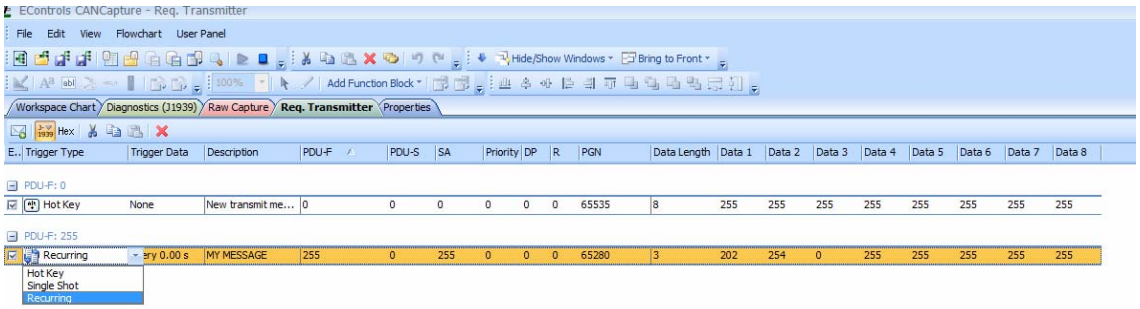
Selecting a Single Shot Trigger

You may select a **Single Shot** by double clicking on the **Trigger Type** option and selecting the [▼] icon and selecting **[Single Shot]** from the drop down menu as illustrated below.



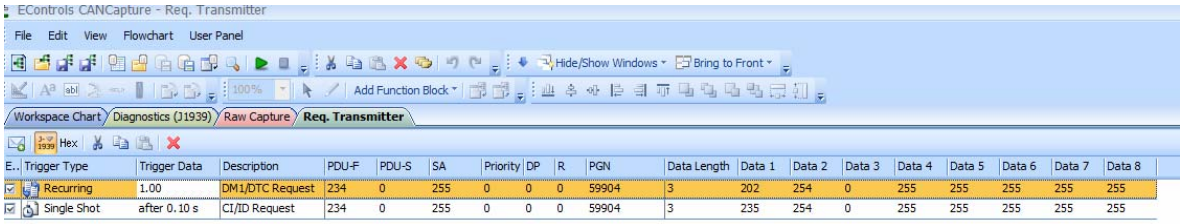
Selecting a Recurring Trigger

You may select a **Recurring Trigger** by double clicking on the **Trigger Type** window and then left clicking on the [**▼**] icon and then selecting **[Recurring]** as illustrated below.



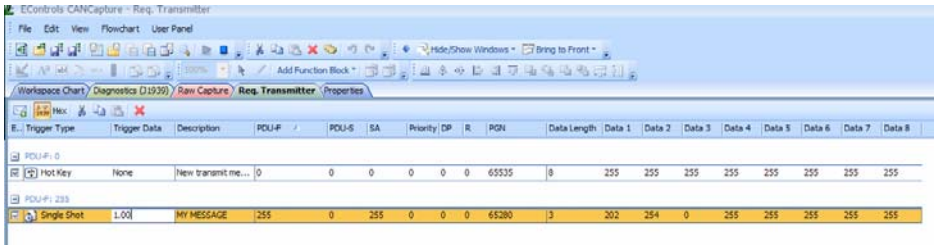
Setting the Time Interval for a Recurring Message

You may set the time interval of the reoccurring message by double clicking the **Trigger option** window by left clicking the mouse and entering the time interval in seconds.



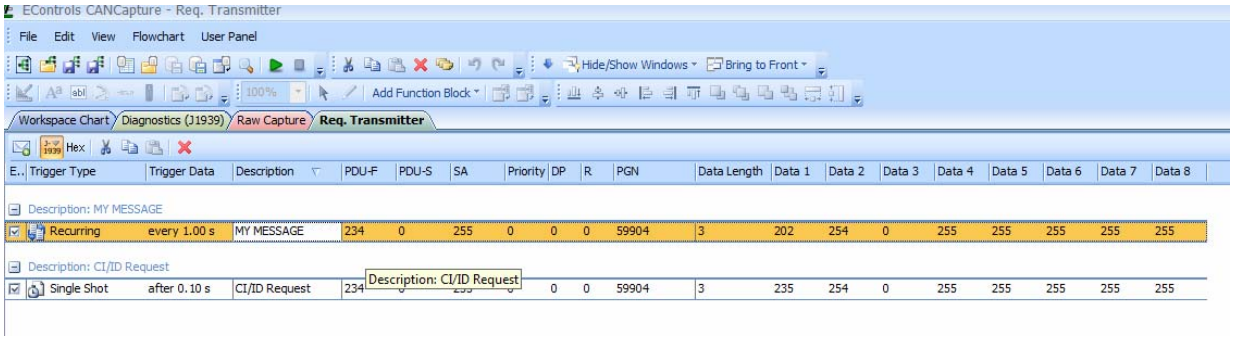
Setting the Time Delay for a Single Shot Trigger

You may set up the time delay for the **Single Shot Trigger** by double clicking on the **Trigger Data** option and entering the **time delay** in seconds as illustrated below. The **time delay** is from the start of the capture.


EControls CANCapture - Req. Transmitter
File Edit View Flowchart User Panel
Workspace Chart Diagnostics (J1939) Raw Capture Req. Transmitter Properties
Hot Key None New transmit me...
Single Shot 1.00 MY MESSAGE

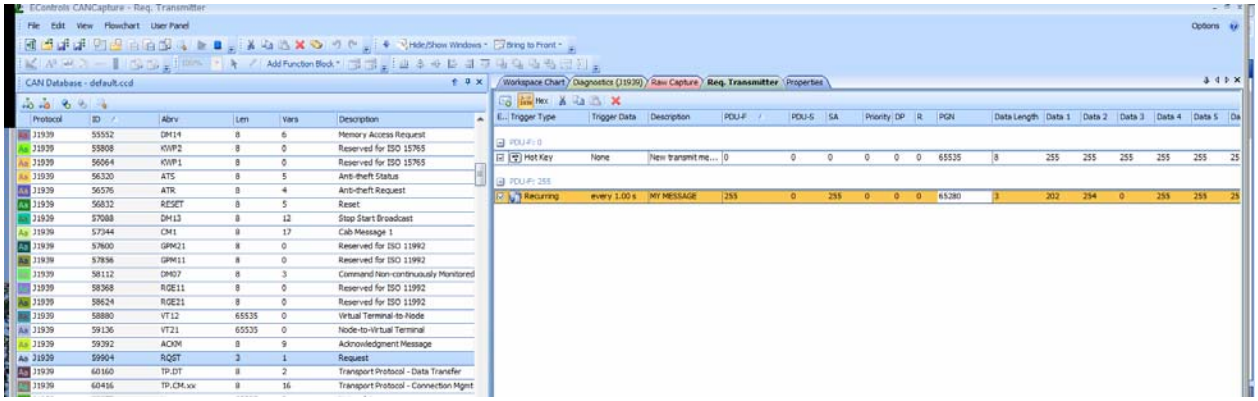
Entering the Message Description

You may enter a **Message Description** by left clicking on the **Description Window** and typing in a description of your choice as illustrated below.


EControls CANCapture - Req. Transmitter
File Edit View Flowchart User Panel
Hide/Show Windows Bring to Front
Add Function Block
Workspace Chart Diagnostics (J1939) Raw Capture Req. Transmitter
Hex
E.. Trigger Type Trigger Data Description PDU-F PDU-S SA Priority DP R PGN Data Length Data 1 Data 2 Data 3 Data 4 Data 5 Data 6 Data 7 Data 8
Description: MY MESSAGE
Recurring every 1.00 s MY MESSAGE 234 0 255 0 0 0 59904 3 202 254 0 255 255 255 255 255
Description: CI/ID Request
Single Shot after 0.10 s CI/ID Request 234 0 0 59904 3 235 254 0 255 255 255 255 255
Description: CI/ID Request

Entering the Message Data

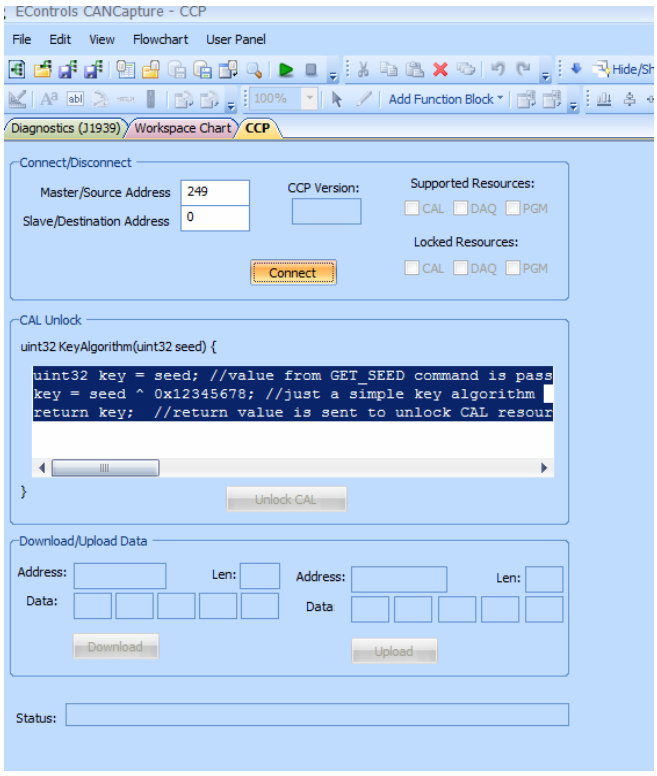
You may enter the **Transmit Message** data by clicking on the specific window and typing in the data from the CAN database as illustrated below.


EControls CANCapture - Req. Transmitter
File Edit View Flowchart User Panel
Options
CAN Database - default.ccd
Workspace Chart
Diagnostics (J1939)
Raw Capture
Req. Transmitter
Properties
Protocol ID Abrv Len Vars Description
E... Trigger Type Trigger Data Description PDU-F PDU-S SA Priority DP R PGN Data Length Data 1 Data 2 Data 3 Data 4 Data 5
Hot Key None New transmit me...
Recurring every 1.00 s MY MESSAGE

CCP Tester Function Block (Advanced Users)

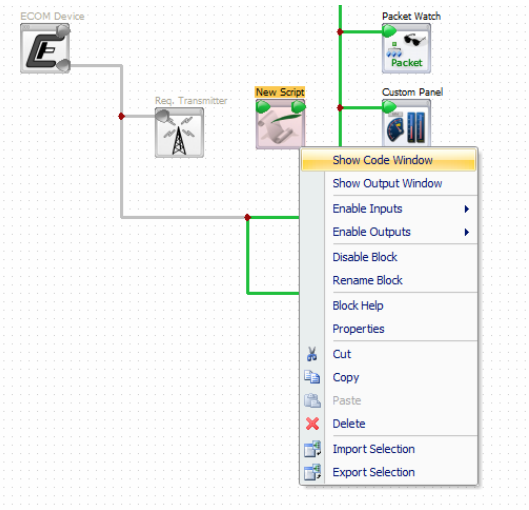
You can configure the **CCP Tester Block** by left clicking on the block and selecting **[Configure CCP]** from the drop down menu as illustrated below. Alternately, you may double click the block to pull up the configuration window.

The following window will open.



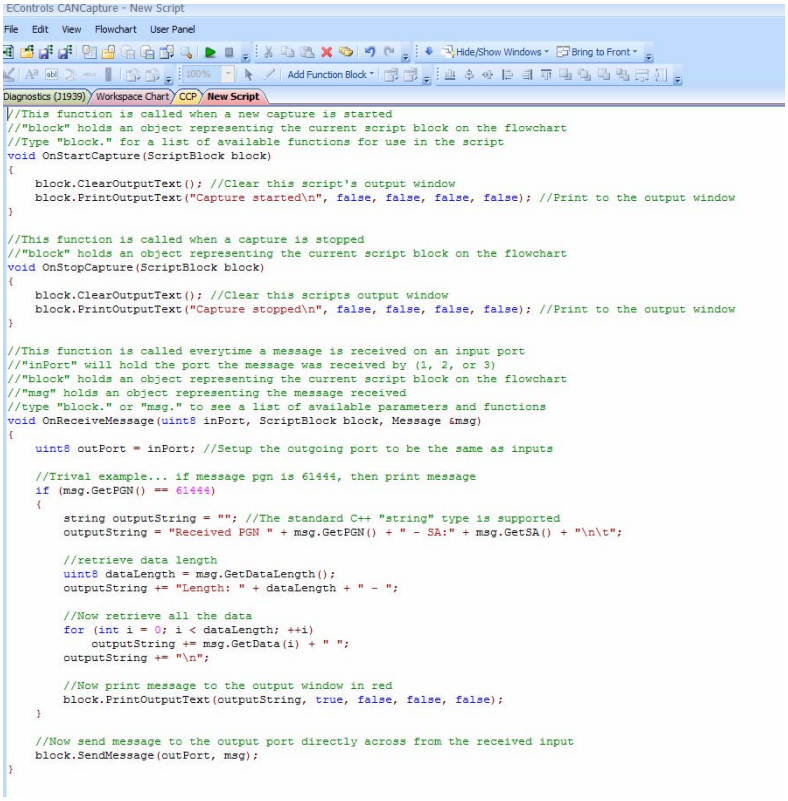
Custom Script Function Block (Advanced Users)

To edit a **Custom Script** to the CAN Bus right click the mouse on the **Custom Script Functional Block** and select **[Show Code Window]** from the drop down menu by left clicking on the selection as illustrated below.



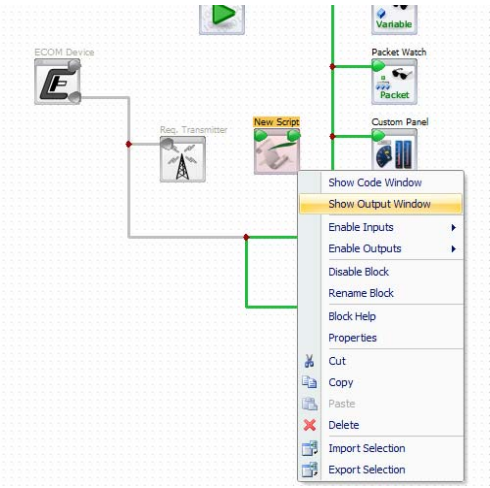
The following window will open showing examples of the various **Custom Script Functional Block** functions. The scripting uses a C / C++ style syntax. The script editor also includes an “auto complete” and “intellitip” feature which will help to show the available variables and functions as well as the parameters and syntax required. Simply type the variable name followed by a ‘.’ to show all variable options.

Note: You may request Custom examples on the CANCapture Technical discussion forum at http://www.concapture.com/forum/html

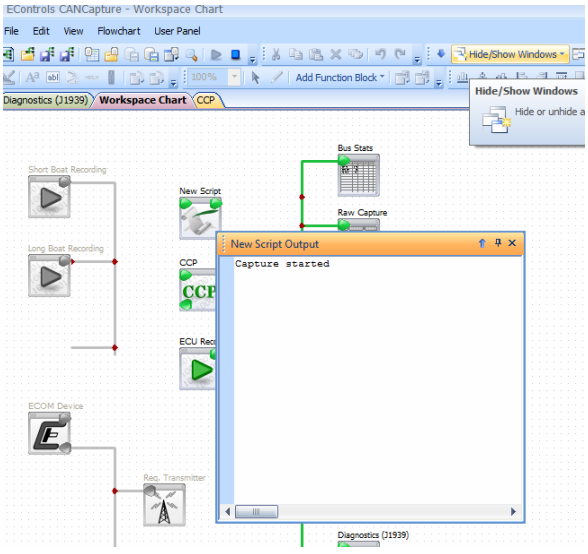

EControls CANCapture - New Script
File Edit View Flowchart User Panel
Hide/Show Windows
Bring to Front
Add Function Block
Diagnostics (J1939)
Workspace Chart
CCP
New Script
//This function is called when a new capture is started
//"block" holds an object representing the current script block on the flowchart
//Type "block." for a list of available functions for use in the script
void OnStartCapture(ScriptBlock block)
{
block.ClearOutputText(); //Clear this script's output window
block.PrintOutputText("Capture started\n", false, false, false, false); //Print to the output window
}
//This function is called when a capture is stopped
//"block" holds an object representing the current script block on the flowchart
void OnStopCapture(ScriptBlock block)
{
block.ClearOutputText(); //Clear this scripts output window
block.PrintOutputText("Capture stopped\n", false, false, false, false); //Print to the output window
}
//This function is called everytime a message is received on an input port
//"inPort" will hold the port the message was received by (1, 2, or 3)
//"block" holds an object representing the current script block on the flowchart
//"msg" holds an object representing the message received
//type "block." or "msg." to see a list of available parameters and functions
void OnReceiveMessage(uint8 inPort, ScriptBlock block, Message &msg)
{
uint8 outPort = inPort; //Setup the outgoing port to be the same as inputs
//Trival example... if message pgn is 61444, then print message
if (msg.GetPGN() == 61444)
{
string outputString = ""; //The standard C++ "string" type is supported
outputString = "Received PGN " + msg.GetPGN() + " - SA:" + msg.GetSA() + "\n\t";
//retrieve data length
uint8 dataLength = msg.GetDataLength();
outputString += "Length: " + dataLength + " - ";
//Now retrieve all the data
for (int i = 0; i < dataLength; ++i)
outputString += msg.GetData(i) + " ";
outputString += "\n";
//Now print message to the output window in red
block.PrintOutputText(outputString, true, false, false, false);
}
//Now send message to the output port directly across from the received input
block.SendMessage(outPort, msg);
}

Displaying the Custom Script Output Window

To display the **Custom Script Output Block** window right click with the mouse on the **Custom Script Functional Block** and select **[Show Output Window]** from the drop down menu by left clicking on the selection as illustrated below.



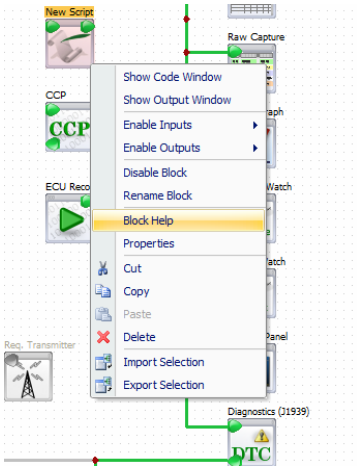
The following window will open displaying the output from the **Custom Script Functional Block.** This window can be used by the script code to provide visual feedback to the end user.



Displaying Custom Script Functional Block Help

To display the help feature for the **Custom Script Functional Block** right click on the **Custom Script Functional Block** and select **[Block Help]** from the drop down menu by left clicking the mouse on the selection as illustrated below.

Note: This **Block Help** feature is available for all **Functional Blocks**.

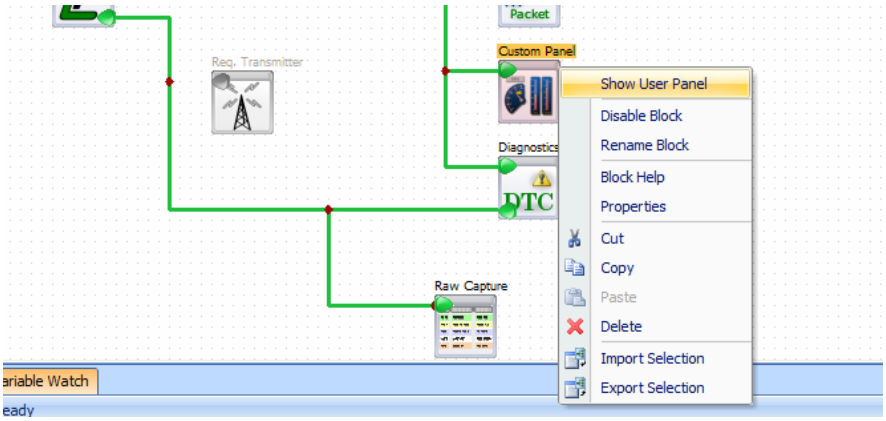


The following window will open.

Script Block Help
This block is used to write customizable code and macros to handle incoming and outgoing messages. It can be used to apply custom encryption/decryption, advanced filters based on message data, notification of certain message sequences, and virtually any other raw message handling that can be coded. The scripting block uses a pseudo-C and C++ style language and has an integrated editor with call-tips and function definitions to help document the available features.
Each script block can consist of up to three input ports and three output ports numbered 1 through 3 from top to bottom. To add an input or output port, simply right-click on the block and enable the desired port.
Incoming and outgoing messages are encapsulated by a class object called "Message". By typing the "Message" variable name followed by a '.', all available functions to manipulate the message data will be shown. Similarly, the script block is encapsulated by a class object called "ScriptBlock", which has associated functions related to the scripting block. For example, to send a message out one of the three ports of the script block, simply type block.SendMessage(outport, message) where outport represents an integer between 1 and three identifying the desired port and message is a "Message" object that contains the desired message to be transmitted.
Each script block has a code window as well as an output window associated with it. The code window is used to type the script that will be executed and the output window can be used to display messages for diagnostic purposes. To print text to the script's output window, simply call the function block.PrintOutputText(...) to print the desired string to the output window.
The scripting language supports the standard C++ string class to handle all character manipulation. For example, to create a string that holds a message's PGN, simply type: string my_string = "Message PGN: " + message.GetPGN();
Certain functions of the scripts are executed based on application events. The following three functions are called when a capture is started, a message is received, and a capture is stopped, respectively:
void OnStartCapture(ScriptBlock block);
void OnReceiveMessage(uint8 inPort, ScriptBlock block, Message &msg);
void OnStopCapture(ScriptBlock block);
When a new script block is created, it will automatically contain example code highlighting the main features of the scripting engine. Use the example code as a starting point and for reference. The example code simply prints information about every received message that has PGN 61444 to the output window. It also sends every incoming message out the corresponding output port.
OK

User Panel Function Block

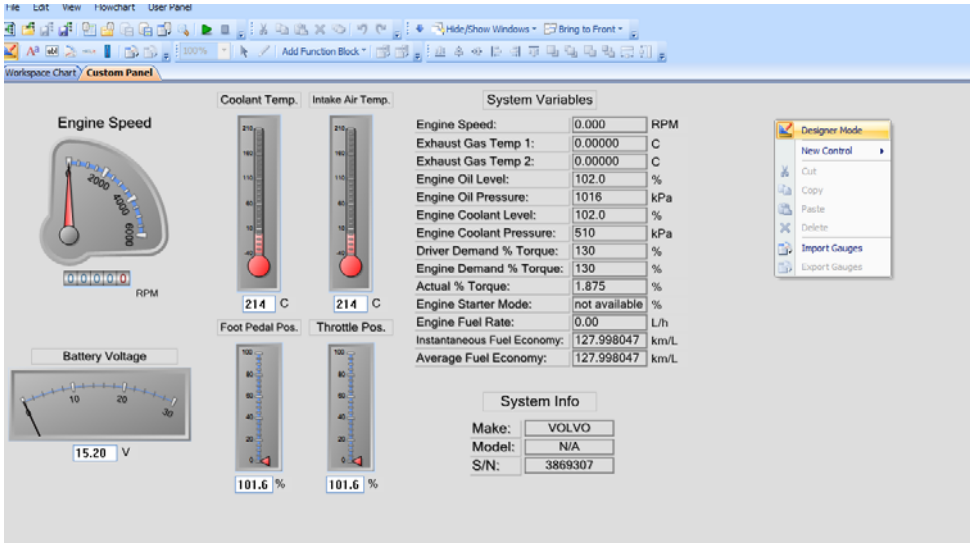
You may open the **Custom Panel** by right clicking on the **Custom Panel Functional Block** and selecting **[Show User Panel]** by left clicking the mouse on the selection. Or by simply double clicking on the **Custom Panel Functional Block**



Invoking the Designer Mode

You may invoke the **Designer Mode** to create your own custom gauge by right clicking the mouse on the **Custom Panel Screen** and selecting **[Designer Mode]** from the drop down menu by left clicking the mouse on the selection as illustrated below.

Note: The capture must be stopped in order to enable this option.

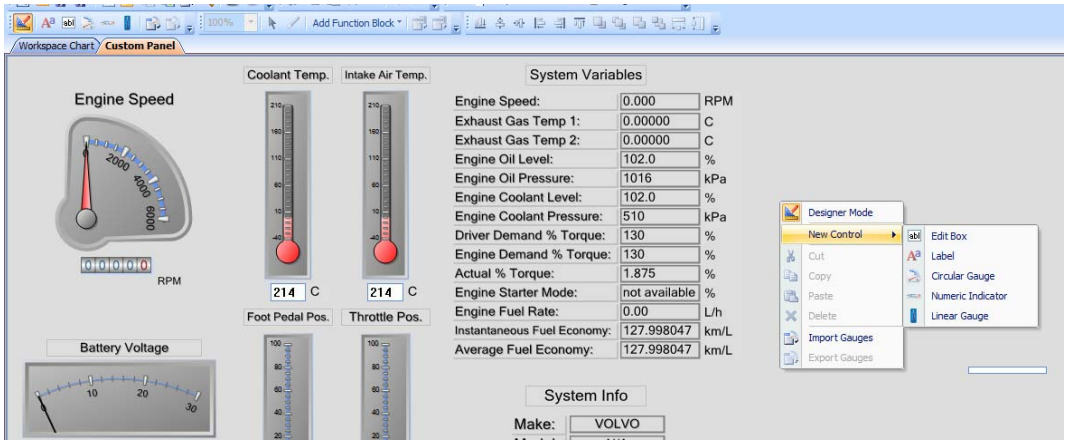


Adding a New Custom Gauge

After selecting the **Designer Mode** you can create a new gauge by right clicking on the **Custom Panel Screen** and selecting **[New Control]** from the drop down menu as illustrated below. The 5 options for **Control Types** are:

- Edit Box
- Label
- Circular Gauge
- Numeric Indicator
- Linear Gauge

Each option will be described in the following sections.



Adding an Edit Box or Label Control

After choosing to add an **Edit Box** or **Label Control** from the **[New Control]** menu**,** you will be prompted with a special mouse cursor signifying which control is about to be created. While this cursor is showing, simply drag and release a square area in the **Custom Panel** workspace to create an **Edit Box or Label** with the respective size. The newly created **Label** will say "**Text**" – various properties of the label, including the actual text, can be changed by following the instructions in the **Overview of the Gauge Container** section below.

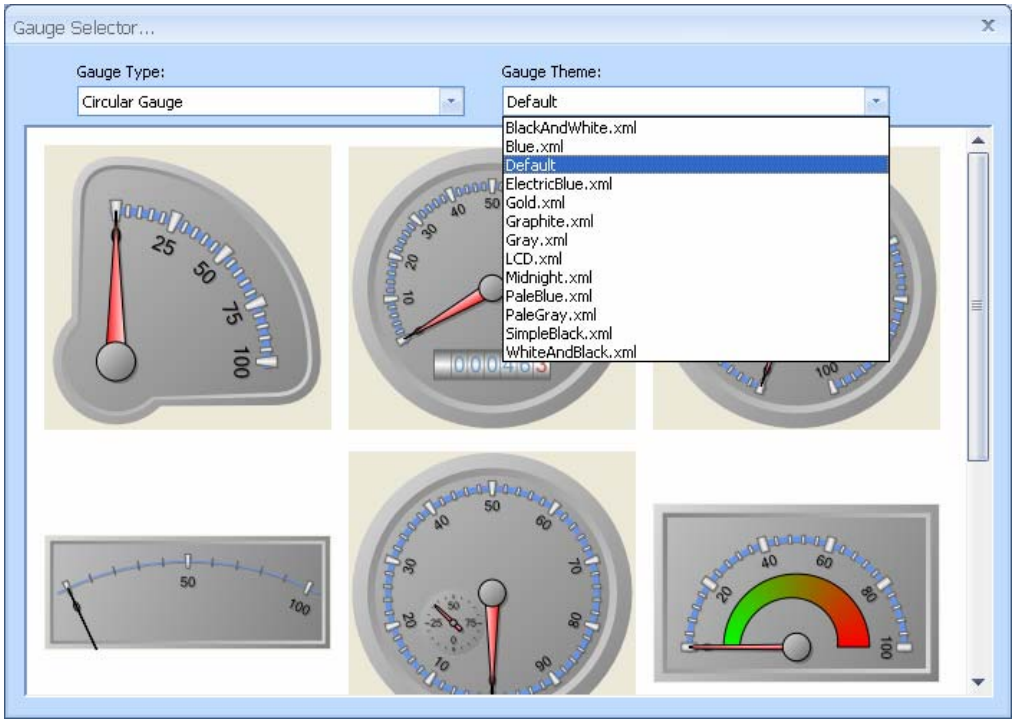
- Examples of **Edit Boxes** are the two controls that show "**214**" in the above image.

- Examples of **Label Controls** are the "**Engine Speed**", "**Battery Voltage**", and "Coolant Temp" displays in the above image.

Adding a Circular Gauge, Numeric Indicator, or Linear Gauge

After choosing to add a **Circular Gauge, Numeric Indicator,** or **Linear Gauge** from the **[New Control]** popup menu, you will be presented with a screen similar to the image below. From this window, you may choose the type of control by selecting one of the options from the **Gauge Type** dropdown menu. For each type of control, you can select from a variety of appearance themes by selecting an option from the **Gauge Theme** dropdown menu.

Advanced Users: You can create your own custom themes by adding or editing the XML files in the **AppearanceThemes** folder. The default location of this directory is C:\Program Files\EControls\CANCapture\Gauge Templates\AppearanceThemes.



When you have found your desired gauge, double click on it and you will be prompted with a special mouse cursor signifying that a gauge control is about to be created. While this cursor is showing, simply drag and release a square area in the **Custom Panel** workspace to create a **Gauge Control** with the respective size.

Overview of the Gauge Container

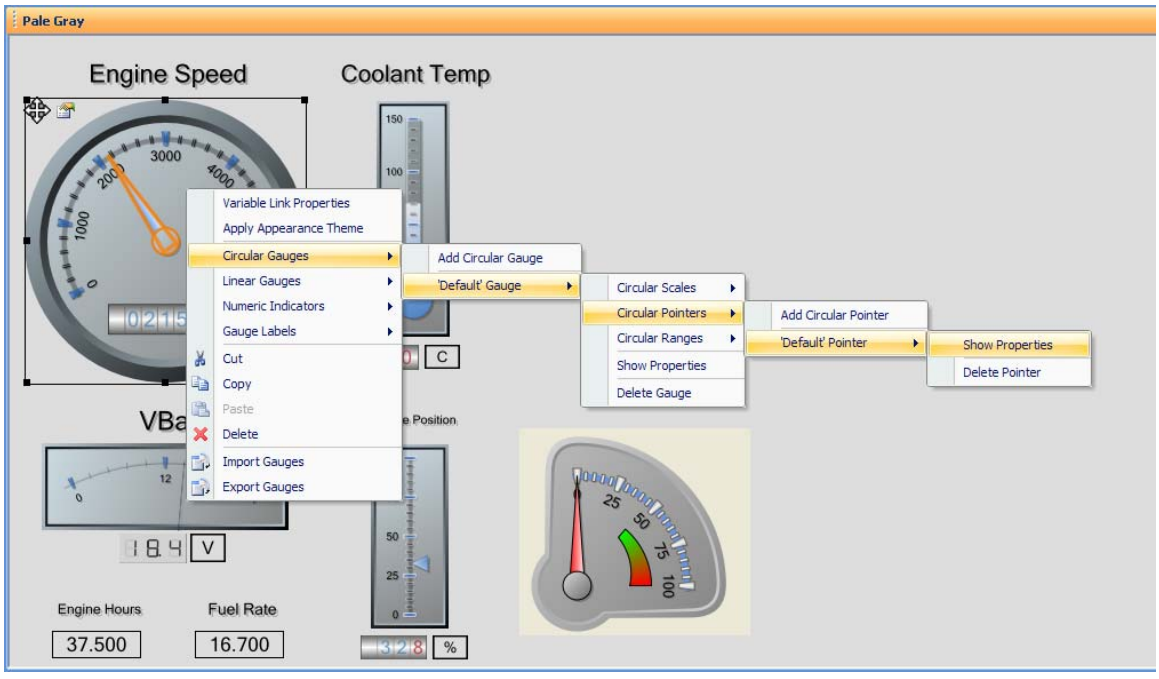
The gauge controls are completely customizable with an infinite number of configurations. Each set of **Circular Gauges**, **Numeric Indicators**, **Linear Gauges,** and **Labels** are contained within a **Gauge Container,** and each **Gauge Container** can contain any number and combinations of these gauge elements.

Each **Circular Gauge** can have various **Circular Scales, Circular Pointers,** and **Circular Ranges:**

- **Circular Scales –** The round portion of the gauge containing the tick marks and the numeric labels. For example, the blue bar ranging from 0 to 100 in the gauge at the bottom-right of the image below.
- **Circular Pointers –** The pointer of each gauge that is used to indicate the value the gauge is showing. This can be a pointer style (as highlighted in orange below), a marker style, or a bar style.
- **Circular Ranges –** This is the visual range such as the "red-line" that is commonly shown on tachometers. An example of this is the green-to-red gradient in the gauge on the bottom-right of the below image.

Each **Linear Gauge** can have any number of **Linear Scales**, **Linear Pointers**, and **Linear Ranges**, which are identical to those of the **Circular Gauge**, but for the respective **Linear Gauge**.

In addition, the **Linear Pointers** also have a "**Thermometer**" style which can be used to indicate the gauge value in a fashion similar to that of a thermometer, as seen in the **Coolant Temp** gauge below.

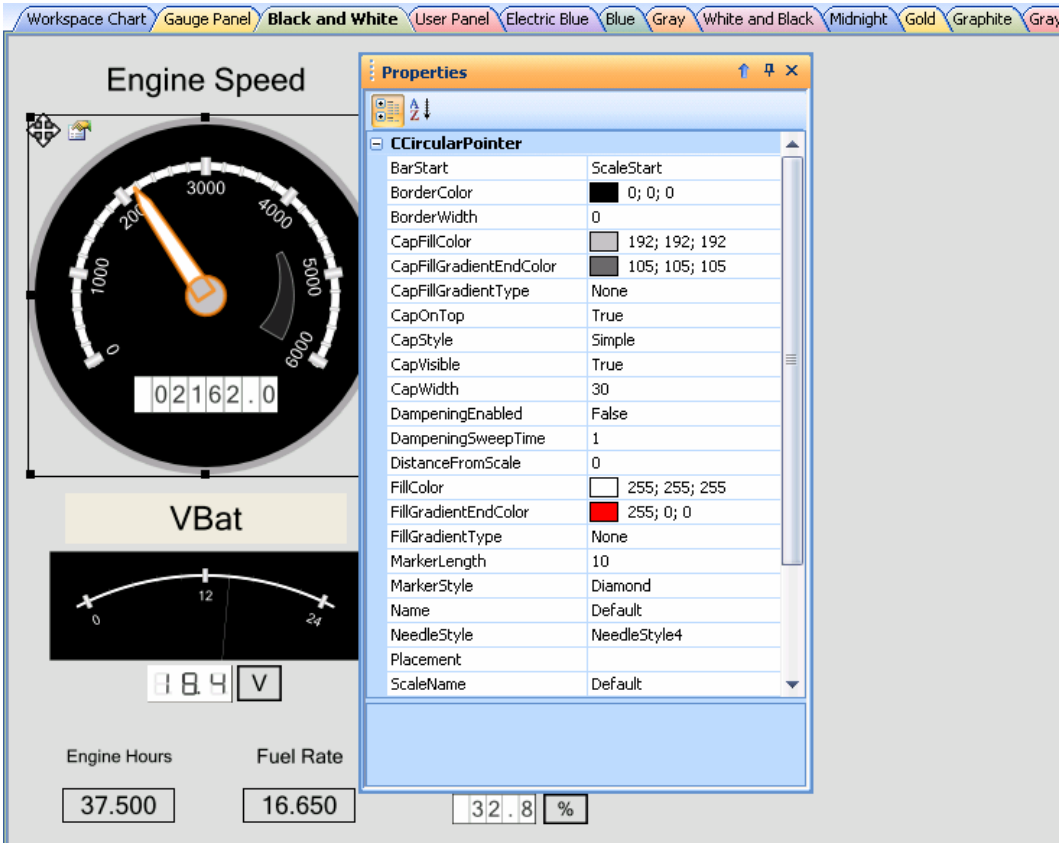


Edit Properties of a Gauge Element

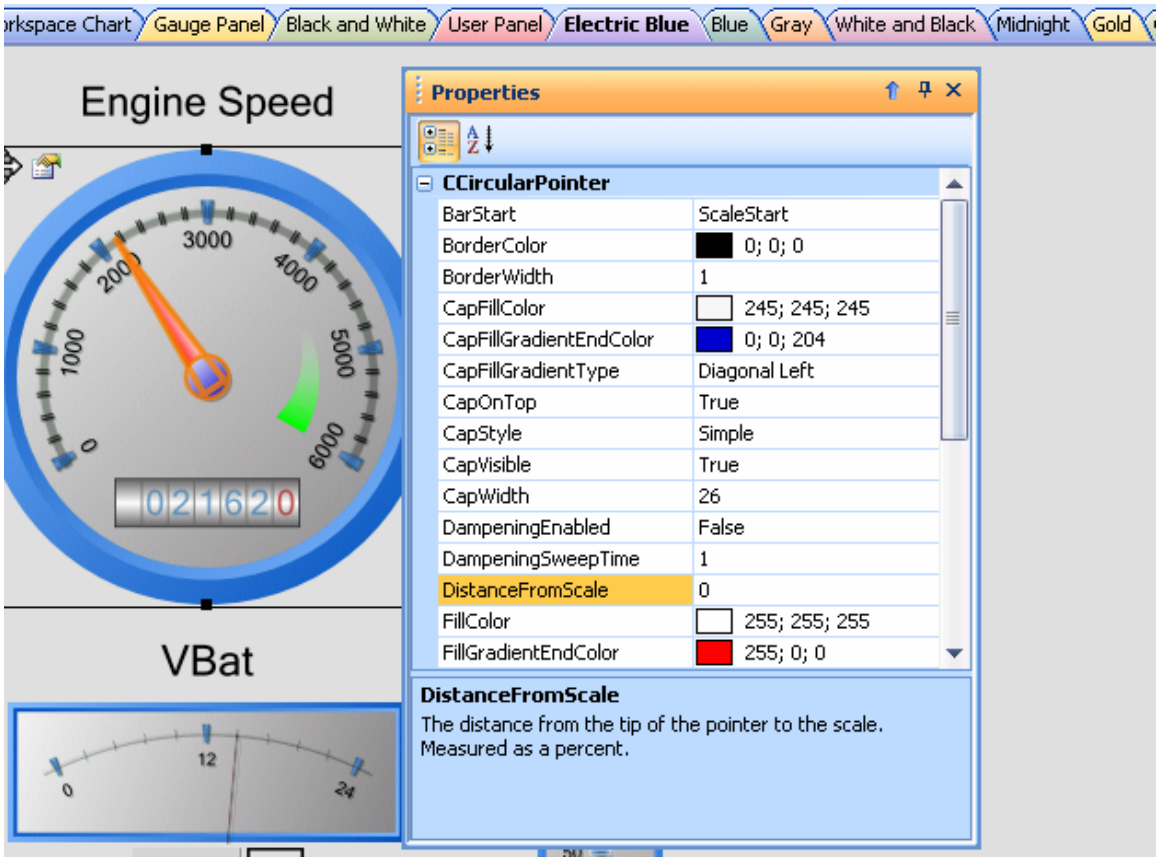
Method 1: To list and edit the properties of any **Gauge Element** within the **Gauge Container**, right-click on the **Gauge Container** and follow the sub-menus beneath the **Circular Gauges, Linear Gauges, Numeric Indicators,** and **Gauge Labels** menus. As you highlight each menu option, the respective gauge element will be outlined and highlighted in orange, as seen in the image on the previous page. To edit a gauge element, select the [**Show Properties**] option for the respective gauge element; this will cause the item's properties to be displayed in the **Properties Window** as seen in the image below.

Method 2: You can also show the properties of a **Gauge Element** by left-clicking on the item while in **Designer Mode**. When the element is selected, it will be highlighted in orange and the element's properties and settings will be visible in the **Properties Window**. An example of this can be seen in the below image.

Note: It is recommended that you have the **Properties Window** visible in a separate window or docking pane while editing the gauge elements.

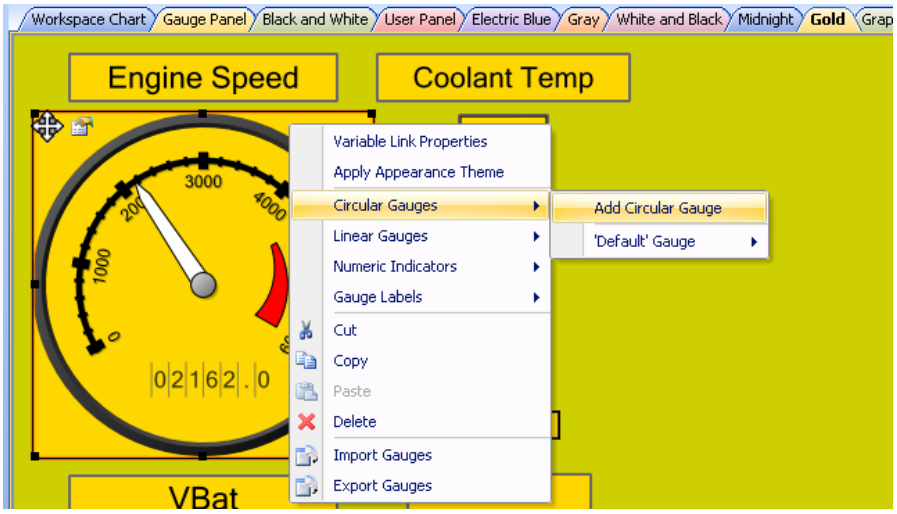


There are many properties and settings for each gauge element, ranging from location, size, and width to color, gradients, styles, and fonts. Rather than describing each property in this manual, a brief description for each property can be displayed by highlighting the property and reading the **Integrated Help Panel** located at the bottom of the **Properties Window.** An example of this integrated help can be seen in the description of the **DistanceFromScale** property in the image below.

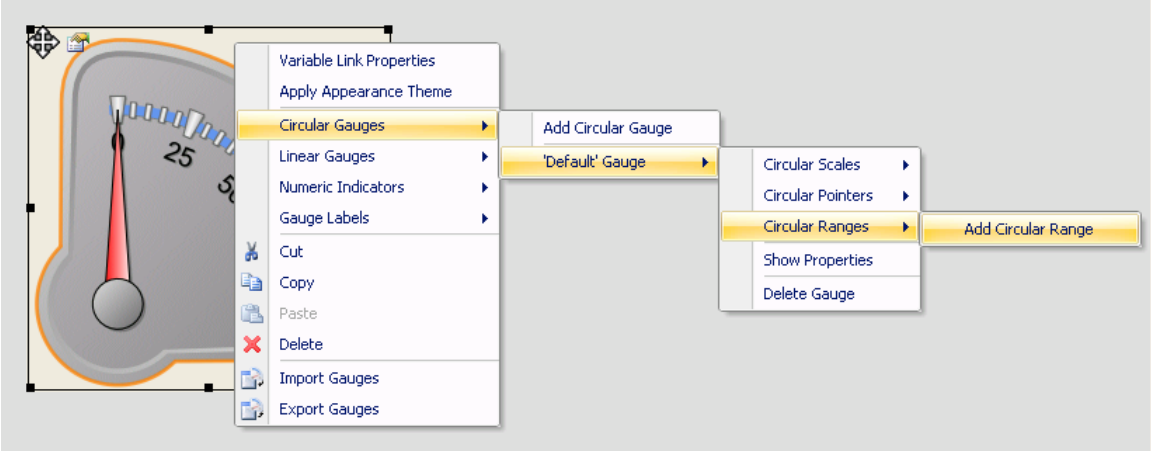


Add Gauge Element to Existing Gauge Container

You can add a **Gauge Element** (i.e. Linear Gauge, Circular Scale, Numeric Indicator, Label, etc.) to an existing **Gauge Container** by right-clicking on the **Gauge Container** and following either the **Circular Gauges, Linear Gauges, Numeric Indicator,** or **Gauge Labels** sub-menus and clicking on the respective **[Add (Element Name)]** option as illustrated below.

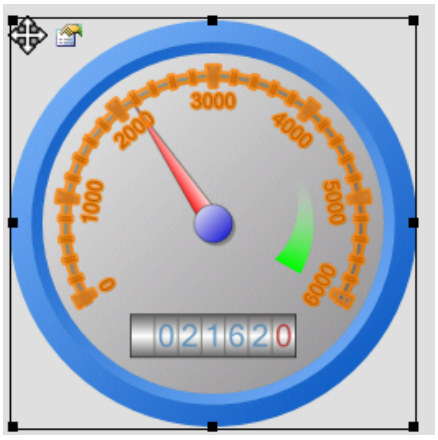


Circular Scales, **Circular Pointers**, and **Circular Ranges** can only be added to existing **Circular Gauges**, and similarly, **Linear Scales**, **Linear Pointers**, and **Linear Ranges** can only be added to existing **Linear Gauges**. An example showing how to add a **Circular Range** to the 'Default' Circular Gauge can be seen in the image below.

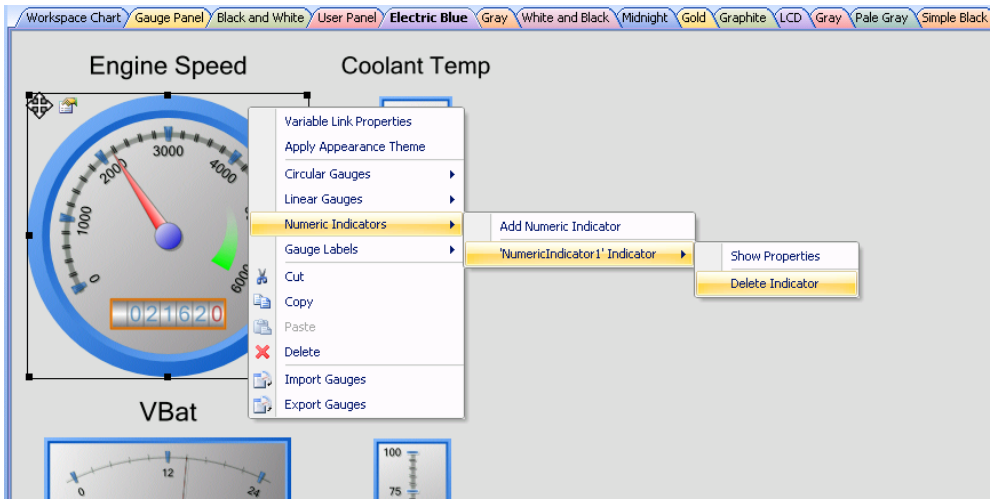


Delete Gauge Element from a Gauge Container

Method 1: You can delete a **Gauge Element** (i.e. Circular Gauge, Linear Pointer, Circular Range, Label, etc.) from an existing **Gauge Container** by left-clicking on the element so that it is selected and highlighted in orange. When the **Gauge Element** is selected you can delete it by now pressing the **Delete Key** on your keyboard. In the example image below, the circular scale that is selected in orange would be deleted after pressing the **Delete Key.**



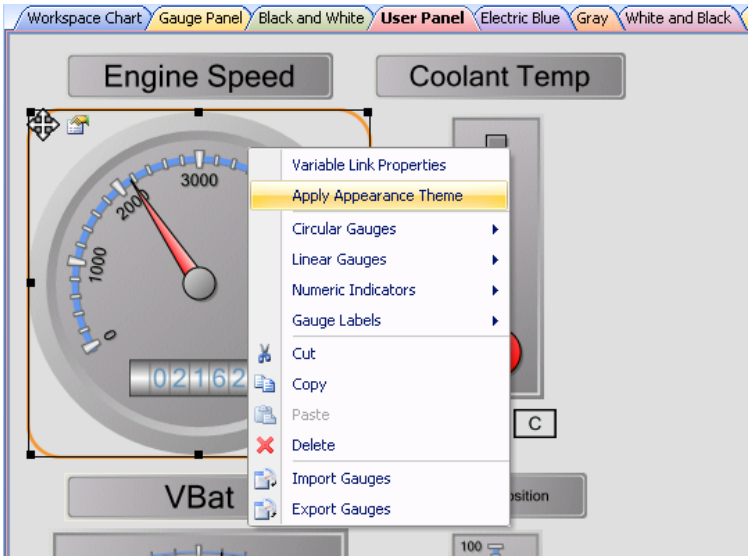
Method 2: If a **Gauge Element** is not visible or off the screen (and therefore you cannot click on it to select it), you can also delete it by right-clicking on the **Gauge Container** and following either the **Circular Gauges, Linear Gauges, Numeric Indicator,** or **Gauge Labels** sub-menus and clicking on the respective **[Delete (Element Name)]**. As your mouse moves over the menu items for each **Gauge Element,** the item will automatically be highlighted so that you can see which item is going to be deleted. The image below shows an example of how to delete a **Numeric Indicator**; notice that the numeric indicator that will be deleted is highlighted in orange.



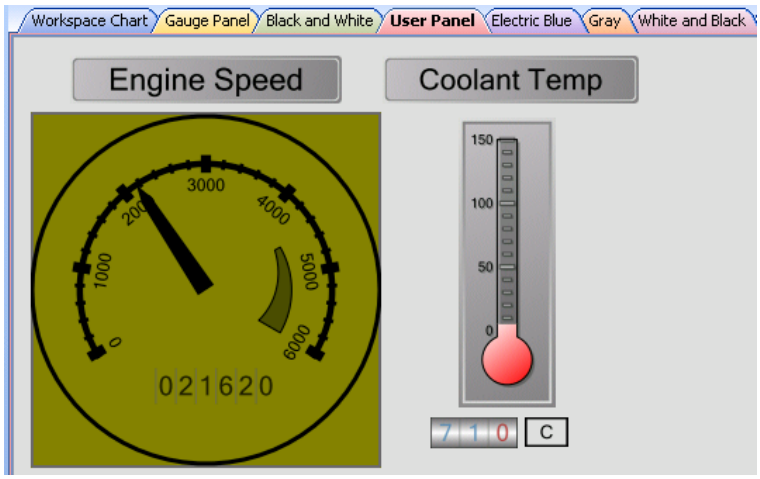
Apply Gauge Appearance Theme

An appearance theme can be applied to any **Gauge Container** by right-clicking on the control and selecting [**Apply Appearance Theme**]. After selecting this option, a **File Select Dialog** will be displayed asking for the Appearance Theme XML file to apply to the **Gauge Container**.

A set of pre-defined **Appearance Themes** can be found in C:\Program Files\EControls\CANCapture\Gauge Templates\AppearanceThemes

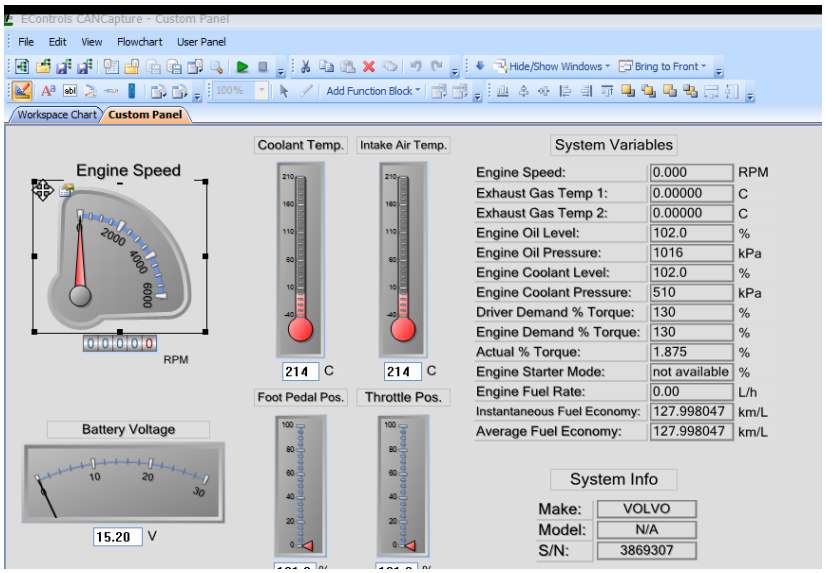


After selecting the **Appearance Theme** file, all the properties defined within the theme will be applied and the **Gauge** will display the new appearance. An example of the **LCD Appearance Theme** applied to the above gauge is shown in the image below.



Repositioning the Custom Gauge Container

You may reposition the gauge by holding the left mouse button down on the crosshairs icon to move the position in the vertical and horizontal axis as illustrated below.

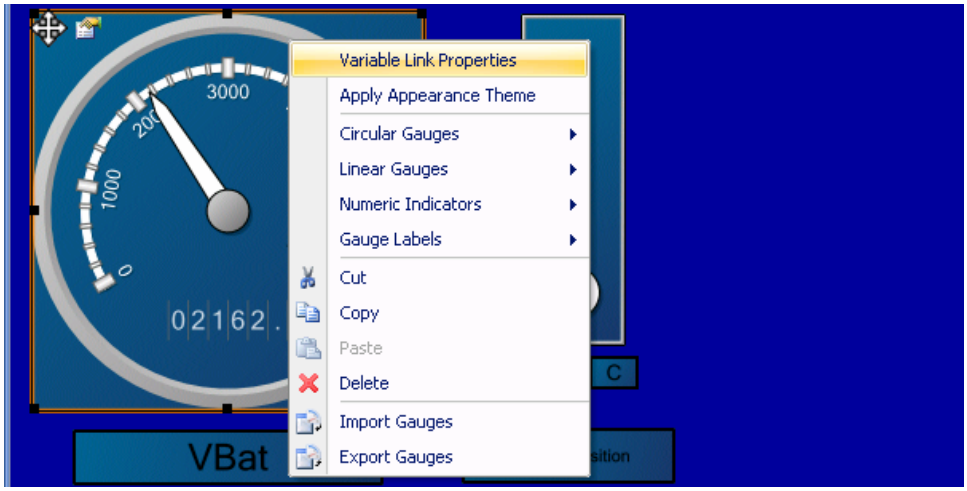


Linking a CAN Variable to a Gauge Element

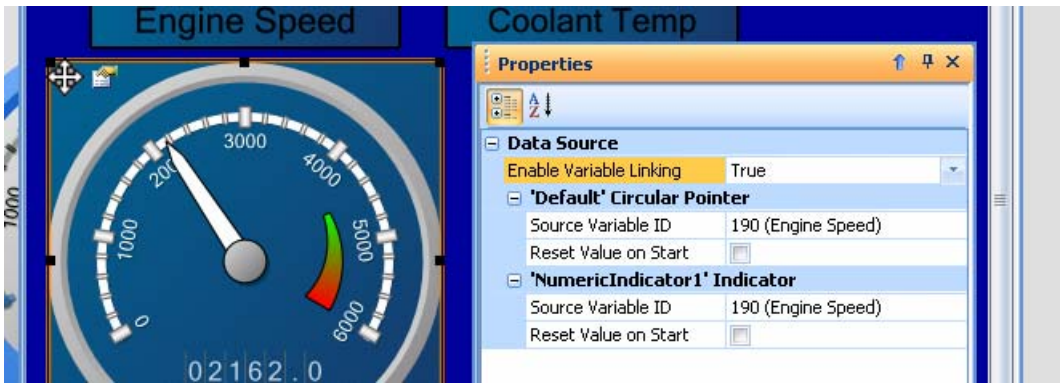
Gauge Elements and **Edit Boxes** can be linked to CAN variables that are defined within the current **CAN Database.** As each CAN variable is received by the **User Panel**, all controls that are linked to the respective variable will be updated in real-time.

To link a variable to a **Gauge Element**, first right-click on the desired **Gauge Container** and select **[Variable Link Properties]** from the drop down menu as illustrated below.

Alternately you can click on the small **Variable Link Properties Icon** in the top left corner of the **Gauge Container** next to the **Move Icon**.

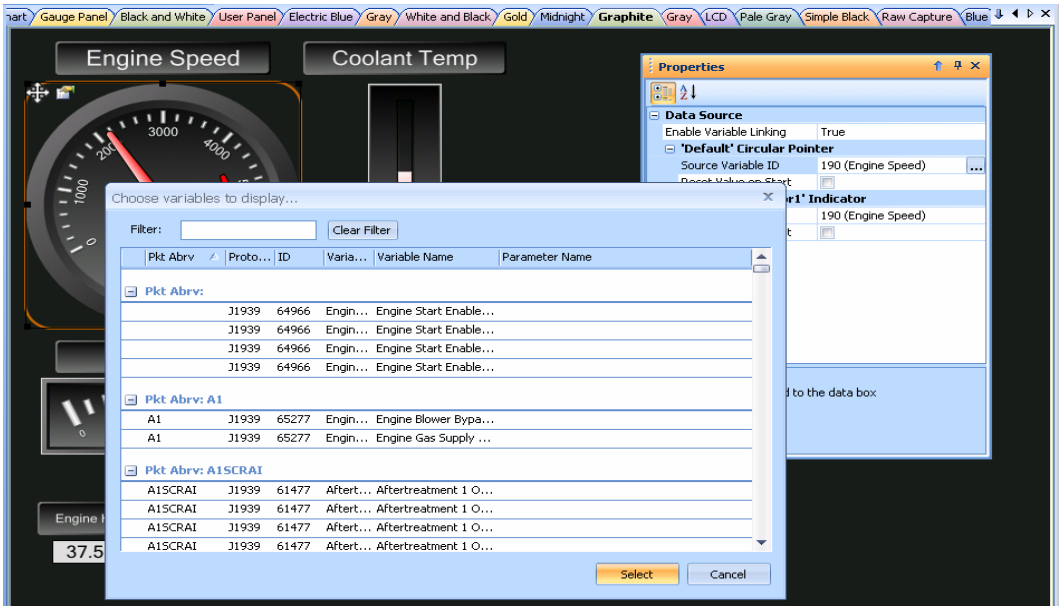


The **Variable Linking** options will now be displayed in the **Properties Window** as illustrated below. If not already enabled, set the **Enable Variable Linking** option to **True**, and you should then see options for each **Circular Pointer**, **Linear Pointer**, **Numeric Indicator**, **Label**, or **Edit Box** that is in the **Gauge Container.**

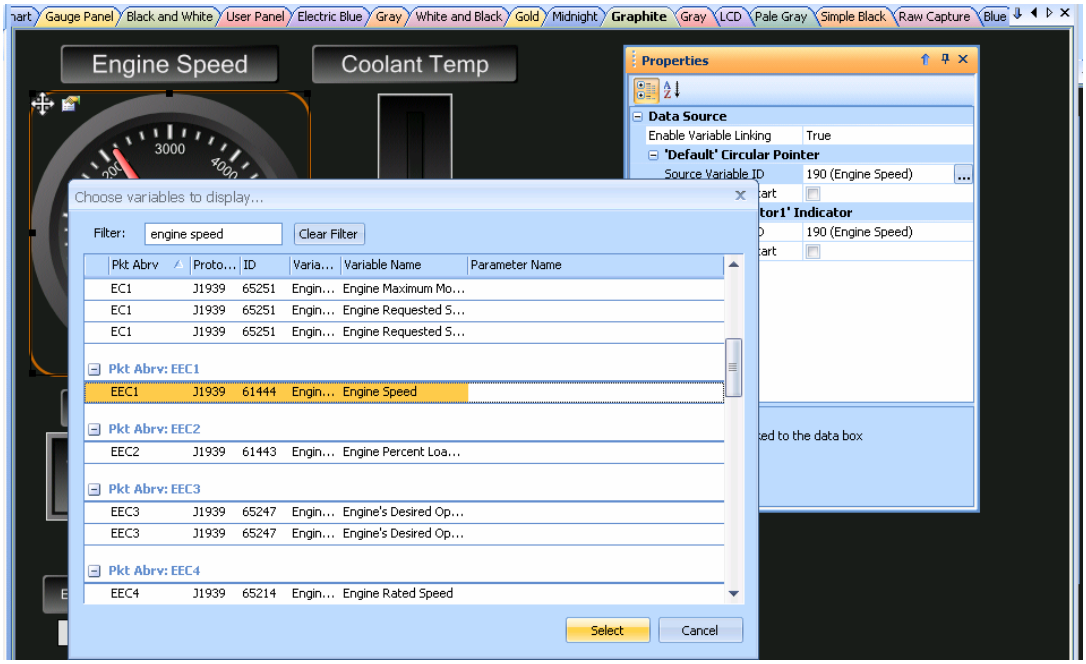


Linking and Setting the Source Variable

You may select the **Source Variable** that you want the respective **Gauge Element** to be linked to by clicking the mouse on the **[...] Icon** on the far right-hand side of the **Source Variable ID** line. You should then receive the **Choose Variable to Display Dialog** as seen in the image below.

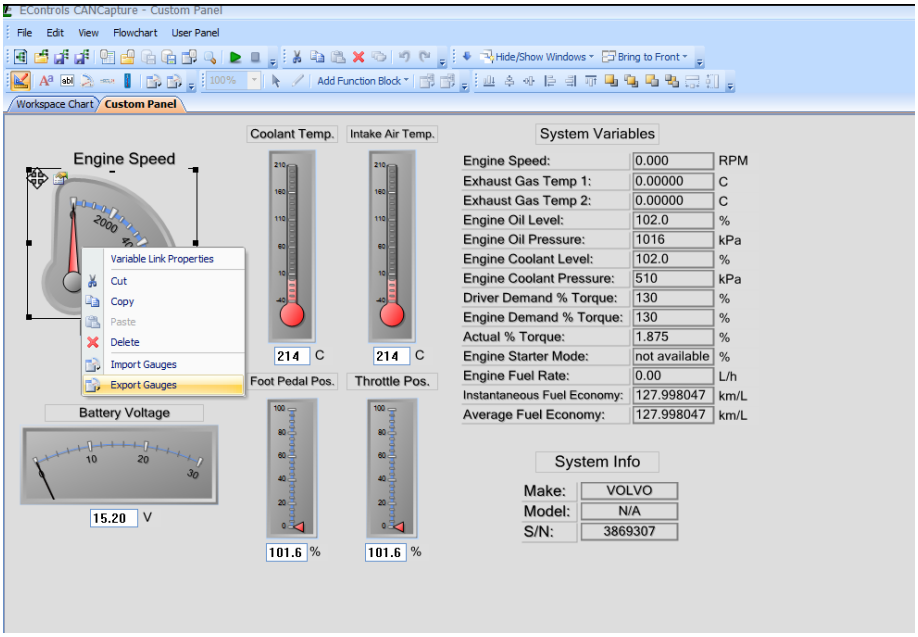


To choose a variable, search for and highlight the desired parameter and then click on the **[Select]** button or simply the double click the selection as illustrated below.

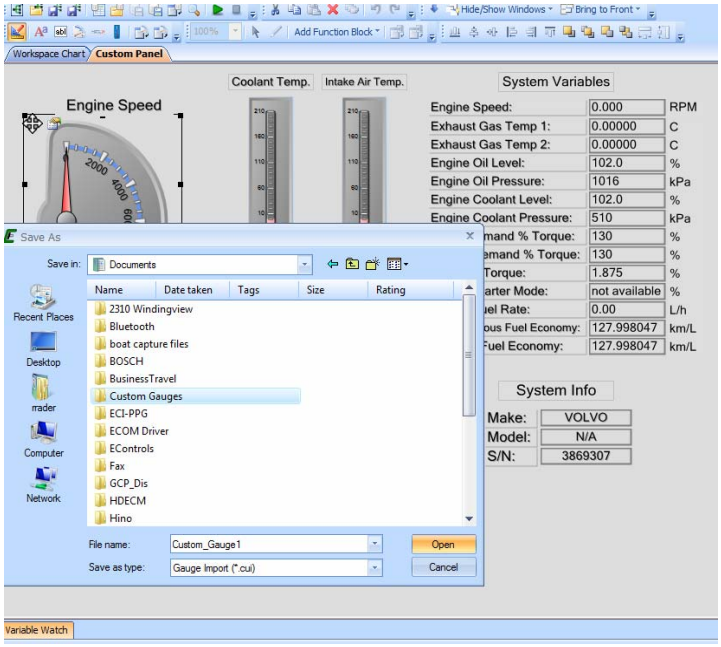


Saving a Custom Gauge Design

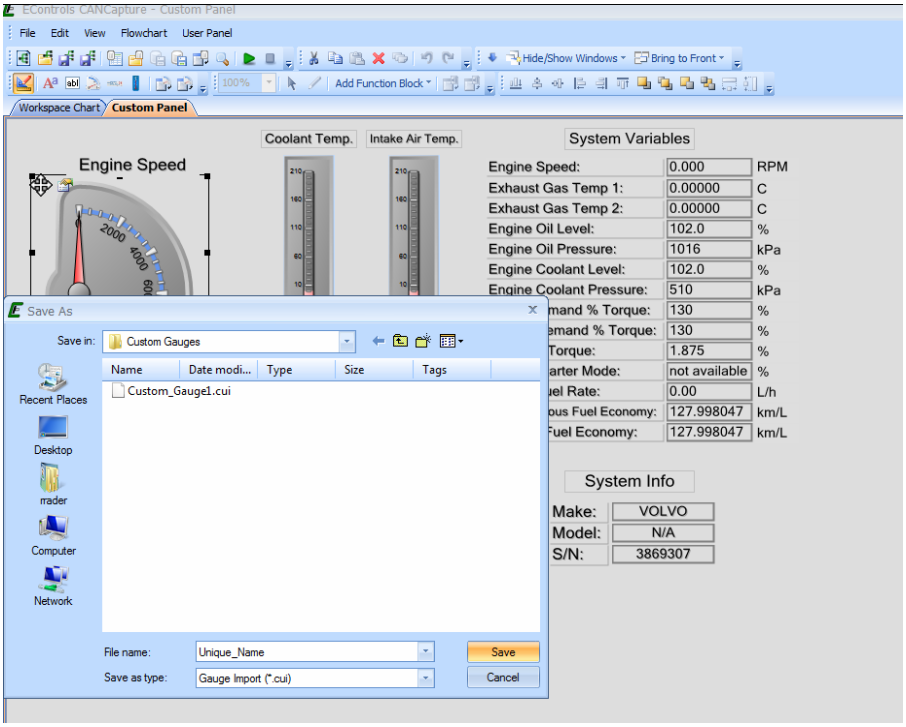
You may save a **Custom Gauge** by right clicking the mouse on the gauge you want to save and selecting **[Export Gauges]** from the drop down menu by left clicking the selection as illustrated below.



The following window will open.



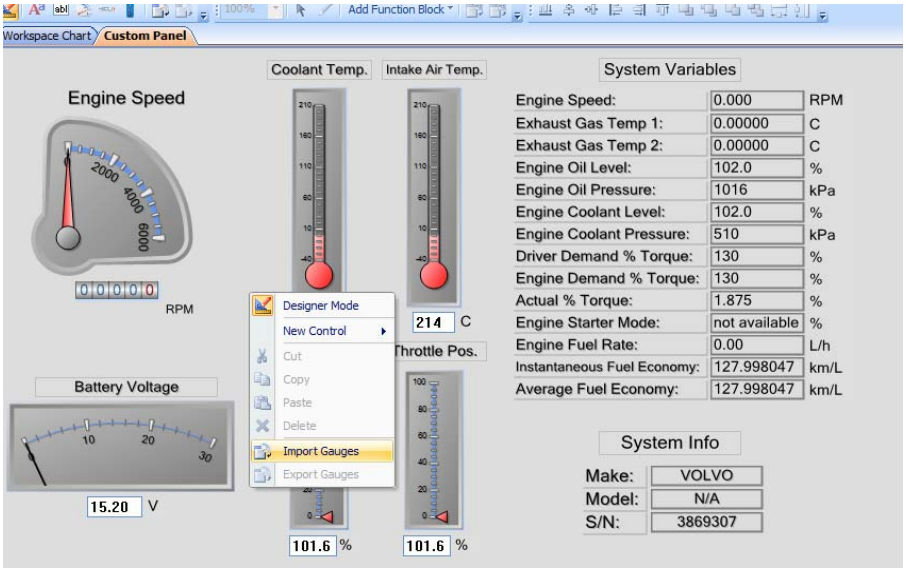
After selecting the destination where you want to save your **Custom Gauge** you can give your gauge file a unique name and save the gauge by left clicking on **[Save]** as illustrated below. The gauge will be saved in the *.cui format.



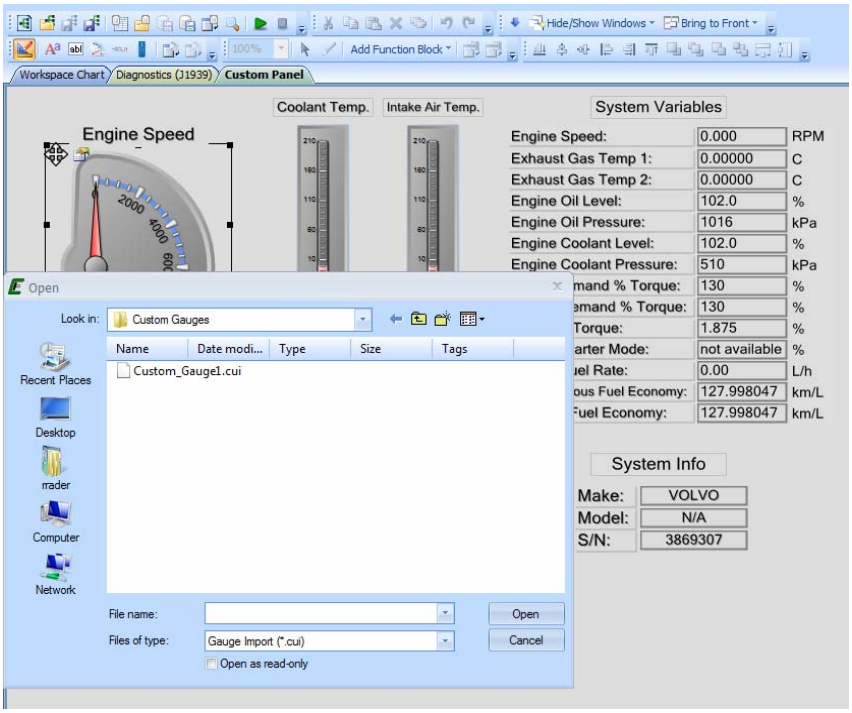
To discard your changes and return to the previous window select **[Cancel]** by left clicking the mouse on the selection.

Importing Saved Gauges

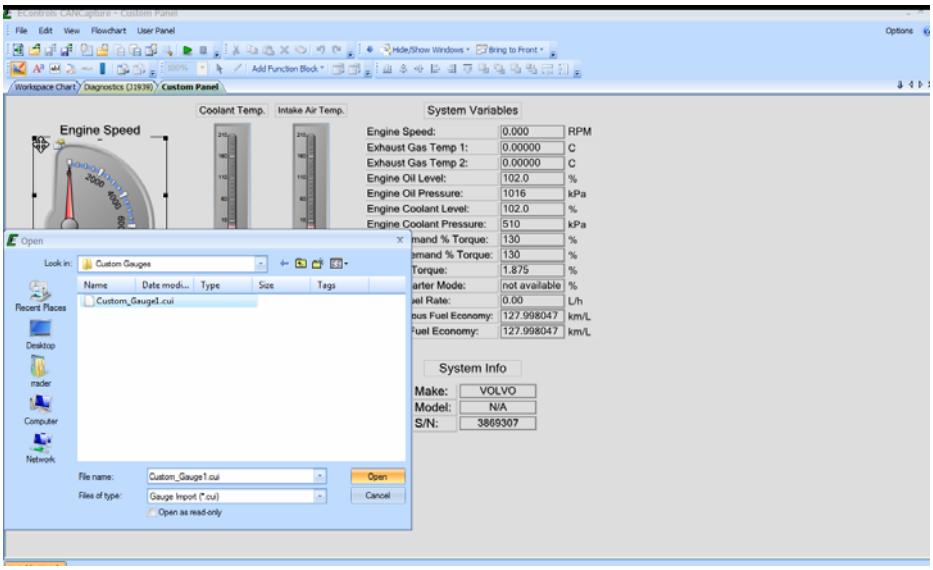
You may import or retrieve saved gauges to you **Custom Panel** by right clicking on the **Custom Panel** workspace and selecting **[Import Gauges]** by left clicking the mouse on the selection.



The following window will open.



You may now browse your computer storage for the gauge that you would like to import. When located you may select it by double clicking on the file name and then import it by left clicking the mouse on the **[Open]** as illustrated below.



If you want to abort the Custom Gauge importing function and return to the previous menu left click on the **[Cancel]** button.